Vol. I

TRANSCRIPT OF RECORD

(Pages 1 to 383)

Supreme Court of the United States

OCTOBER TERM, 1948

No. 7

THOGER GRONBERG JUNGERSEN, PETITIONER,

vs.

OSTBY AND BARTON COMPANY AND AMERICAN ASSOCIATES, INC.

No. 8

OSTBY AND BARTON COMPANY AND AMERICAN ASSOCIATES, INC., PETITIONERS,

vs.

THOGER GRONBERG JUNGERSEN

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT

PETITIONS FOR CERTIORARI FILED DECEMBER 4, 1947.

CERTIORARI GRANTED JUNE 7, 1948.

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United States District Court

DISTRICT OF NEW JERSEY.

OSTBY and BARTON COMPANY, and AMERICAN ASSOCIATES, Inc., a corporation, Plaintiff, vs. THOGER GRONBERG JUNGERSEN, Defendant.	Civil Action 1438

Docket Entries.

1941		
Mar.	18	Complaint, filed
	18	Summons, issued
	26	Summons returned served personally March 21, filed
Apr.	14	Stipulation and order extending time to answer, filed
	29	Motion and Notice of motion for order for security for costs, to dismiss case, and for more definite statement, filed
May	19	Plaintiff's particulars, filed
	19	Hearing on motion to dismiss entire case. Decision reserved. Other portions of motion adjourned without date pending decision on motion to dismiss (Smith)
Oct.	31	Memorandum, filed (Smith)
Nov.	24	Order denying motion to dismiss complaint, filed
1942		
Apr.	13	Notice of motion, affidavits and order granting leave to take depositions, filed
	13	Affidavit of service, filed

July	22	Depositions on behalf of plaintiff, filed
	30	Depositions of sundry witnesses on behalf of plaintiff, filed
1943		
Apr.	24	Amendment to complaint for declaratory judgment, filed
May	4	Order directing defendant to file answer within 20 days, filed
	27	Answer and counterclaim, filed
	27	Notice fixing place for trial, filed (Newark)
June	14	Reply to counterclaim, filed
Nov.	3	Call of calendar, case marked ready
1944		
Mar.	24	Notice of substitution of George D. Richards, as attorney for defendant in place of Milford Salny, filed
Apr.	4	Call of calendar—case marked ready
	26	Depositions of Raymond E. Ostby, *et al.*, filed
July	14	Notice fixing 9/19/44 as date for trial mailed counsel
Aug.	28	Hearing on motion for adjournment—Ordered case listed for the call of 10/24/44 (M)
Sept.	28	Notice fixing trial for Oct. 27th mailed counsel
Oct.	16	Order, stipulation, amendment and supplement to the complaint as amended, filed (Fk)
	16	Ordered new trial date to be fixed (S)
	20	Defendant's answer to amendment and supplement to the complaint as amended, filed
Nov.	1	Notice fixing December 1st, for trial sent counsel
1945		
May	22	Depositions of Lewis W. Gibbons, Morris Kaysen, William Lesse, Samuel Main and Augustine Carosiello, filed

June	1	Depositions on behalf of plaintiff, filed
July	17	Notice fixing Sept. 12, 1945 for trial sent counsel
Sept.	4	Ordered motion for adjournment of trial date, granted. Ordered case marked off until next term calendar. (M)
Oct.	1	Ordered motion for adjournment of trial date. Granted. Ordered case adjourned to 10-23-45 (M)
	23	Trial without jury, before the Hon. Thomas F. Meaney, Judge. Motion on behalf of plaintiff, that the American Associates, Inc., be joined as a party plaintiff. Decision reserved (M)
	29	Transcript of trial, filed (M)
1946		
May	7	Opinion, filed
	15	Order making American Associates, Inc., a corporation a party plaintiff, filed (Meaney) Notice mailed
	16	Findings of fact and conclusions of law, filed May 15, 1946
	16	Notice of motion and motion for an order joining the American Associates, Inc., as a party plaintiff, filed Oct. 23, 1946
	23	Stipulation and order to return certain exhibits, filed May 22, 1946 (M)
	23	Final judgment filed on May 22, 1946, in favor of plaintiffs and against defendants: 1) Adjudged that claims 1 to 4 inclusive of Jungersen patent No. 2,118,468 are valid: 2) Adjudging that claims 5 and 6, thereof, are invalid and void:

3) That no claim of said Jungersen Patent is infringed by the plaintiffs;
4) Dismissing counterclaim and
5) Enjoining defendant from further litigation (Meaney) Notice mailed.

23 Patent report sent to U. S. Commissioner of Patents, Wash., D. C.

Aug. 23 Notice of appeal, filed 8/21/46 (Plaintiff's)

23 Notice sent William P. Rowland, Clerk U.S.C.C.A. and George D. Richards, Atty. for defendant

23 Notice of appeal, filed 8/22/46 (Defendants)

23 Notice sent William P. Rowland, Clerk U.S.C.C.A. and Milton, McNulty & Augelli, Esqs., for plaintiffs

23 Stipulation waiving filing of Bond on Appeal, filed 8/22/46

Sept. 30 Consent order extending time for filing record on appeal to 11/19/46 (Smith) notice mailed. Copy sent Wm. P. Rowland, U.S.C.C.A.

Oct. 15 Stipulation of contents of record on appeal, filed.

In the

District Court of the United States

For the District of New Jersey.

Ostby and Barton Company, Plaintiff, vs. Thoger Gronberg Jungersen, Defendant.	Civil Action No. 1438

Complaint (For Declaratory Judgment).

(Filed March 18, 1941)

To the Honorable the Judges of the United States District Court for the District of New Jersey.

Plaintiff, for its complaint herein, alleges:

1. That the plaintiff, Ostby and Barton Company, is a corporation duly organized and existing under and by virtue of the laws of the State of Rhode Island, and is a citizen and resident of said state; and upon information and belief that the defendant, Thoger Gronberg Jungersen, is a citizen and resident of the State of New Jersey within the District of New Jersey, residing at 11 Pittsford Way, Summit, Union County, New Jersey.

2. That this action arises out of an actual controversy between the parties hereto and jurisdiction is conferred on this Court by Section 274 (d) of the Judicial Code (28 USCA § 400) and by the Patent Laws of the United States.

3. That the plaintiff has manufactured and sold and is manufacturing and selling various types of jewelry, including rings, made of precious or other metals, and that plaintiff's products have become widely known and large quantities of them have been sold throughout the United States and in foreign countries; and that since 1936, plaintiff has been engaged in business of manufacturing rings made of precious or other metals, and that in such manufacture, plaintiff produces such rings of wax and thereafter casts the final product in a mould made by the use of said patterns.

4. That on May 24, 1938, United States Letters Patent No. 2,118,468 issued to defendant upon his application filed September 28, 1934, and that said patent related to a "Method of Casting Articles of Intricate Design and a Product thereof," and that in view of the art, said patent disclosed no matter which, from the standpoint of patentability, amounted to invention, and that no patent could have been duly and legally issued on the subject matter claimed therein.

5. That an actual controversy has arisen and exists between plaintiff and defendant in that defendant by letter from its attorney, A. Yates Dowell, dated June 27, 1938, notified plaintiff of alleged infringement of said Jungersen patent No. 2,118,468 and demanded that plaintiff "discontinue the infringement and render an accounting of damages and profits or else obtain rights under the patent"; and that thereafter plaintiff, by letter from its attorneys, Barlow & Barlow, dated September 13, 1938, wrote said A. Yates Dowell stating *inter alia* that "My client does not infringe this Jungersen patent" (No. 2,118,468). That this letter was not acknowledged by defendant and defendant took no other or further action against plaintiff, and plaintiff assumed that defendant no longer asserted any claim against it, until some

time after October 30, 1940, when plaintiff was informed that defendant had instituted a certain action in the United States District Court for the Eastern District of Pennsylvania entitled "Thoger Gronberg Jungerson, Plaintiff, against Sears-Roebuck & Company, defendant, Civil Action No. 1238" (hereinafter referred to as the Philadelphia action); and that the complaint filed therein alleges infringement by the there defendant Sears-Roebuck & Company, of claim 6 only of said Jungersen patent No. 2,118,468, by the sale of articles alleged to have been made in accordance with and embodying the invention disclosed and claimed in said claim 6; and that on or about February 1, 1941, the plaintiff, in said Philadelphia action, supplemented said complaint therein by its bill of particulars, which *inter alia* states: "The articles or products of the defendant which are alleged to infringe the patent in suit are those which have been purchased from or caused to be made for defendant by manufacturing jewelers and/or jewelry supply houses which manufacture and/or sell cast jewelry in accordance with the patent in suit, and it is alleged that (a) * * * Ostby & Barton of Providence, Rhode Island (is) among such manufacturing jewelers or jewelry supply houses"; and that a full and complete determination of the controversy between plaintiff and defendant cannot be secured in said Philadelphia action.

6. That plaintiff denies that plaintiff's process and plaintiff's product, or either of them, infringe said Letters Patent No. 2,118,468, or any valid claim thereof.

7. That in view of the art plaintiff has the full and complete right to manufacture, use and sell plaintiff's products and to use plaintiff's process, and that the claim made by defendant, that plaintiff's products and plaintiff's process, or either of them, are covered by its said patent No. 2,118,468, or any valid claim thereof, and the

harassment by defendant of plaintiff's customers and plaintiff's potential customers, constitute an unfair and unwarrantable attempt by defendant to restrain plaintiff from doing that which plaintiff has the complete right to do, and interferes with and obstructs the sale of plaintiff's products, and that the effect of defendant's unwarranted claim is to retard and injure plaintiff in the proper conduct of its business, all to plaintiff's great loss and damage.

8. That plaintiff, upon information and belief, avers that said patent No. 2,118,468 is invalid and void because said Thoger Gronberg Jungersen was not the original and first inventor of the alleged improvements described and claimed therein, but that the same, in all of their material and substantial parts, were invented, known to and used by others in this country before his alleged invention or discovery thereof, were patented and described in printed publications in this and foreign countries before his alleged invention or discovery thereof and more than two years prior to his application for patent, and were in use and on sale in this country for more than two years prior to his application.

(a) That the patents and printed publications referred to in so far as they have at present been ascertained, are as follows:

Patentee	No.	Date
Spencer	748,996	January 5, 1904
Haseltine (British)	2,467/1875	January 8, 1876,

and by others as yet unknown to plaintiff but as to which plaintiff begs leave to advise the Court by amendment to this complaint.

(b) That the instances of prior invention, prior knowledge and use by others, and prior public use and sale above referred to, in so far as they have at present been

ascertained, are by the patentees of the patents, and by the authors of the printed publications set forth in subparagraph 8 (a) above, and at the places set forth in said patents and printed publications, and elsewhere, and by—

Austenal Laboratories, Inc.,
34 West 33rd Street, New York, N. Y.
and Chicago, Illinois,

and by others as yet unknown to plaintiff but as to whom plaintiff begs leave to advise the Court by amendment to this complaint.

9. That plaintiff, upon information and belief, avers that said patent No. 2,118,468 is invalid and void for each of the following reasons:

(a) Because the alleged inventions described and claimed therein did not constitute patentable subject matter within the meaning of the law;

(b) Because no invention was required to devise and perfect the alleged invention described and claimed therein, in view of the state of the art existing prior to the alleged invention;

(c) Because the claims of the said patent No. 2,118,468 are indefinite, ambiguous and uncertain and do not particularly point out and distinctly claim the part, improvement or combination which the patentee claims as his invention or discovery;

(d) Because the said Thoger Gronberg Jungersen did not comply in all respects with the conditions and requirements of the United States statutes in such cases made and provided for the prosecution of the patent application upon which said patent No. 2,118,468 was granted, and that prosecution of said application before the Patent Office was unlawful and was not in compliance

16 *Complaint (For Declaratory Judgment)*

in all respects with the applicable statutes and the rules of the United States Patent Office.

10. That plaintiff, upon information and belief, avers that by reason of the proceedings in the United States Patent Office during the prosecution of the application which resulted in said patent No. 2,118,468 and the admissions and representations therein made by or on behalf of the applicant in order to induce the grant of said patent the defendant is estopped to claim for such patent a construction, were the same otherwise possible,
17 such as would cause said patent to cover or include the acts of the plaintiff of which the defendant has complained.

11. That plaintiff, reasserting and realleging all of the allegations of paragraph 5 hereof, avers that plaintiff relying upon the failure of defendant to assert any further claim against plaintiff subsequent to the said letter of September 13, 1938, was prompted to enlarge and expand its business as to which defendant asserts infringement of said Jungersen patent No. 2,118,468, wherefore defendant is estopped now to assert any claim of any nature whatsoever based upon plaintiff's alleged in-
18 fringement of said patent.

12. That plaintiff, reasserting and realleging all of the allegations of paragraph 5 hereof, avers that defendant's inaction from the date of said letter of September 13, 1938, constitutes laches debarring defendant from asserting any claim of any nature whatsoever based upon plaintiff's alleged infringement of said patent.

WHEREFORE plaintiff prays:

1. That a summons issue directed to defendant commanding it to appear herein and answer the allegations contained in the foregoing complaint and to abide by

and perform such other orders and decrees as this Court may make in the premises;

2. That this Court enter a decree adjudging that said patent No. 2,118,468 to Thoger Gronberg Jungersen, and each and every claim thereof, is invalid and void, and that plaintiff's products and plaintiff's process do not infringe said patent, or any claim thereof;

3. That an injunction issue perpetually enjoining defendant, or any one in privity with it, from bringing or prosecuting, or threatening to bring or prosecute any civil action charging infringment of said patent No. 20
2,118,468, or any claim or claims thereof, against plaintiff, its agents, vendees, or others in privity with it or them;

4. That this cause be expedited in every way consistent with equity and justice;

5. That defendant be decreed to pay the costs and disbursements of this suit; and

6. That the Court grant to plaintiff such other and further relief as shall be just.

OSTBY AND BARTON COMPANY
By MILTON, McNULTY & AUGELLI 21
Per JOHN L. MILTON
Its Attorney
1 Exchange Place,
Jersey City, N. J.

John Vaughan Groner,
Of Counsel,
20 Exchange Place,
New York, N. Y.

Dated: March 13, 1941.

22 **Amendment to Complaint for Declaratory Judgment.**

(Filed April 24, 1943.)

The plaintiff, Ostby and Barton Company, hereby amends its complaint, heretofore filed herein, by supplementing Paragraph 8 (a) thereof as follows:

After the words: "Hazeltine (British) 2467/1875 January 8, 1876" and before th words "and by others as yet unknown to plaintiff" etc., add

"*Printed Publication*

La Gravure, La Ciselure, Le Modelage,
23 by. Leon Verleye"

and by supplementing Paragraph 8 (b) thereof as follows: After the words "Austenal Laboratories, Inc., 34 West 33rd Street, New York, N. Y. and Chicago, Illinois," and before the words "and by others as yet unknown to plaintiff" etc., add

"Abraham Slatis,
Room 708, 30 N. Dearborn Street,
Chicago, Illinois,
at Chicago, and

"Thomas J. Dee & Company,
24 1900 West Kinzie Street,
Chicago, Illinois,
at Chicago, and

"Kaspar and Esh, Inc.,
126 West 46th Street,
New York, N. Y., at
New York, N. Y."

OSTBY AND BARTON COMPANY

By JOHN L. MILTON
Its Attorney,
1 Exchange Place,
Jersey City, N. J.

Defendant's Answer and Counterclaim

John Vaughan Groner,
Of Counsel,
Fish, Richardson & Neave,
20 Exchange Place,
New York, N. Y.

Dated: April 5, 1943.

Copy received this day of April, 1943
Attorney for Defendant

Defendant's Answer and Counterclaim.

IN THE

DISTRICT COURT OF THE UNITED STATES,

FOR THE DISTRICT OF NEW JERSEY.

OSTBY AND BARTON COMPANY, Plaintiff, vs. THOGER GRONBERG JUNGERSEN, Defendant.	Civil Action No. 1438

(Filed May 24, 1943.)

A. Defendant's Answer

Defendant for its answer to the complaint of plaintiff states:

1. Defendant is not advised, save by the complaint, as to the incorporation and citizenship of the plaintiff, and therefore denies the allegations thereto pertinent in par.

agraph 1 of the complaint; defendant, Thoger Gronberg Jungersen, admits that he resides at 11 Pittsford Way, Summit, Union County, New Jersey, and is a citizen of the United States.

2. Defendant admits that there is an actual controversy between the parties hereto, and defendant admits that this Court has jurisdiction under the Patent Laws of the United States.

3. With respect to paragraph (3) of the complaint, defendant admits that plaintiff produces rings of wax and thereafter casts the final product in a mold made by the use of the wax ring as a pattern, and has no information as to the other allegations and therefore denies the same.

4. With respect to paragraph 4 of the complaint, defendant admits that on May 4, 1938, United States Letters Patent No. 2,118,468 issued to defendant upon his application filed September 28, 1834, and that said patent relates to a "Method of Casting Articles of Intricate Design and a Product Thereof"; defendant denies the remaining allegations of said paragraph.

5. With respect to paragraph 5 of the complaint, defendant admits that by a letter from its attorney, A. Yates Dowell, dated June 27, 1938, notice was given to plaintiff of Jungersen patent No. 2,118,468 and that plaintiff was invited to obtain a license; defendant admits that plaintiff by a letter from its attorneys, Barlow & Barlow, dated September 13, 1938, wrote said A. Yates Dowell that "My client does not infringe this Jungersen patent" (No. 2,118,468). Defendant denies that this letter was not acknowledged by defendant and that defendant took no other or further steps in connection with relations or proposed relations of plaintiff and defendant; and denies that plaintiff assumed that defendant

no longer asserted any claim against plaintiff until some time after October 30, 1940; the defendant admits that the complaint in the Philadelphia suit alleged infringement by Sears-Roebuck and Company of claim 6 of said Jungersen patent No. 2,118,468 by the sale of articles in accordance with and embodying the invention of said claim 6; defendant admits that on or about February 1, 1941 the plaintiff in said Philadelphia action by its Bill of Particulars alleged that Ostby and Barton of Providence, Rhode Island, manufacture and/or sell cast jewelry in accordance with the patent in suit; defendant denies that determination of the controversy between plaintiff and defendant, insofar as plaintiff is concerned, could not have been secured in said Philadelphia action.

6. Defendant denies all the allegations of paragraphs 7, 8, 9, 10, 11 and 12 of the complaint.

7. Defendant in further answer to plaintiff's complaint, alleges that on occasions it sought interviews with plaintiff's office and factory with regard to plaintiff's activities and defendant's patented process and that plaintiff conferred at length with the defendant with regard to defendant's process and that these conferences took place both prior to and after the issuance of defendant's patent herein referred to, and that in the earlier conferences between plaintiff and defendant, plaintiff informed defendant that it was not interested in using defendant's process because the amount of business which plaintiff contemplated that it could do by using defendant's process would not be sufficient to warrant the taking of a license from defendant; at later conferences between plaintiff and defendant, plaintiff indicated to defendant that it had tried out defendant's process as explained to plaintiff at the earlier conferences and that it had decided to discontinue using defendant's process and that it was going to discontinue using defendant's process and plaintiff

indicated that as it had very little use for defendant's process it was not interested in taking a license "for the present;" that defendant first learned from Sears-Roebuck, the defendant in the Philadelphia action, that Ostby and Barton, the plaintiff in this action, were suppliers of articles which were an infringement of defendant's patent; and that it was not until after Sears-Roebuck gave defendant this information that defendant in its Bill of Particulars alleged that Ostby and Barton were suppliers to the defendant in the Philadelphia action of articles which were alleged to be an infringement of defendant's patent.

WHEREFORE, defendant denies that the plaintiff is entitled to the relief prayed for in the said complaint and prays that the defendant be hence dismissed with costs assessed against the plaintiff.

B. Defendant's Counterclaim

As counterclaim against Plaintiff, Defendant avers:

8. This counterclaim arises under the patent laws of the United States and jurisdiction of this Court is based upon the patent laws of the United States and the fact that the plaintiff has asked this Court to take jurisdiction of the subject matter involved in the counterclaim under the Declaratory Judgment Act, Section 274d of the United States Judicial Code 28 USCA Section 400.

9. Defendant, Thoger Groiberg Jungersen, is a resident of Summit, New Jersey, and a citizen of the United States.

10. That the plaintiff, Ostby and Barton Company, is a corporation duly organized and existing under and by virtue of the laws of the State of Rhode Island, and is a citizen and resident of said State.

11. Thoger Gronberg Jungersen, being within the meaning of the statutes of the United States then in force, the original, first and sole inventor of "Method of Casting Articles of Intricate Design and a Product Therefor," and being entitled to a patent thereon under the provisions of said statutes, did, on September 28, 1934, duly file in the United States Patent Office application Serial No. 745,893, for Letters Patent of the United States on said invention.

12. All the requirements of the then existing statutes of the United States and Rules of Practice of the United States Patent Office having been complied with, Letters Patent No. 2,118,468 were duly issued to defendant, Thoger Gronberg Jungersen.

13. Plaintiff, since the issuance of said Letters Patent No. 2,118,468 and prior to this counterclaim, has infringed said Letters Patent and it is believed will continue to so infringe by selling or causing to be sold within this District and elsewhere within the United States, articles in accordance with and embodying the invention set forth in defendant's patent No. 2,118,468 and by practicing and causing others to practice within this District and elsewhere within the United States the invention set forth in defendant's patent No. 2,118,468, all wilfully and without consent of the defendant.

14. Defendant, prior to the bringing of this action, has given the plaintiff written notice of such infringement.

15. Defendant's patent to Jungersen No. 2,118,468 has already been adjudicated and found to be valid in the following cases:

(1) Jungersen v. Morris Kaysen Company—Civil Action No. 358—District Court for the Eastern District of Pennsylvania—44 U. S. P. Q. 257

(2) Jungersen v. Jenkins, trading as Jenkins Jewelry Manufacturing Co., *et al.*—Civil Action No. 216—District Court for the District of Maryland—43 U. S. P. Q. 448

(3) Jungersen v. A. Mazia and Son, Inc., and Fred Williamson—Civil Action No. 957—District Court for the Eastern District of Pennsylvania—Consent decree granted August 28, 1940

(4) Jungersen v. James A. Apffel Co., a corporation, James A. Apffel, and W. C. Ramstein—Civil Action No. 1163-Y—District Court for the Southern District of California—Consent decree granted November 30, 1940

(5) Jungersen v. Sears-Roebuck & Company—Civil Action No. 1,238—District Court for the Eastern District of Pennsylvania—Consent decree granted April 17, 1941

(6) Thoger Gronberg Jungersen v. Johnson, Matthey & Company Limited, English Patents Appeal Tribunal, Royal Courts of Justice, decided December 1, 1937, by Mr. Justice Luxmoore.

(7) Thoger Gronberg Jungersen v. John Louis Schwarz, doing business as Variety Jewelry Company—Civil Action No. 15-296 District Court for the Southern District of New York

16. That the jewelry industry in the United States and in other countries throughout the world has generally recognized defendant's patent No. 2,118,468 and the merits of the invention set forth therein by accepting licenses under defendant's said United States patent No. 2,118,468 and corresponding foreign patents and changing from the accepted prior known methods of manufacture to defendant's patented process.

17. That such jewelry industry has found, by actual practice in the field, that defendant's patented process has been successful and has resulted in a great saving of labor and expense and has also made possible the production of jewelry of attractive intricate designs at moderate cost which designs otherwise could only be produced at such relatively high cost as to inhibit the sale thereof in quantities.

WHEREFORE, defendant prays for the judgment of this Court:

1. For the damages caused defendant by the herein 44
complained of infringement, together with plaintiff's profits resulting from said infringement and that said damages to be paid by plaintiff to defendant be trebled in view of the wilful and deliberate nature of the infringement;

2. That said defendant's patent No. 2,118,468 be declared valid;

3. That acts of the plaintiff be declared to constitute an infringement of defendant's patent No. 2,118,468;

4. That a permanent injunction during the term of said Letters Patent No. 2,118,468 be issued enjoining and 45
restraining the plaintiff, its officers, directors, associates, attorneys, clerks, agents, servants, workmen and employees and each of them from directly or indirectly making or causing to be made, using or causing to be used, selling or causing to be sold, advertising or offering for sale, or causing to be advertised or offered for sale, agreeing or contracting to sell, causing to be agreed or contracted for sale, supplying or causing to be supplied, threatening to offer or contract for sale, or supply, or disposing of in any manner, articles embodying or employing the teaching or teachings of said Letters Patent No. 2,118,468 or any substantial material or vital part

or parts thereof, and from infringing upon or contributing or abetting the infringement of said Letters Patent, in any way whatsoever;

5. That the defendant be entitled to an accounting for damages and an assessment of costs against the plaintiff.

6. That plaintiff deliver up to defendant all molds, including metal and rubber molds, wax patterns and other matter used or intended to be used in connection with the process or articles taught by Letters Patent No. 2,118,468 which are in the possession or under the control of the plaintiffs, including merchandise on consignment in the possession of plaintiff's customers, to the end and purpose that the same may be destroyed;

7. That the plaintiff deliver to defendant all finished article or articles in the process of fabrication in their possession or under their control which are embodied in defendant's patent to the end and purpose that the same may be destroyed; and

8. For such additional relief as this Court may deem just.

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Attorney for Defendant

Service acknowledged this 24th day of May, 1943

MILTON, McNULTY & AUGELLI
Counsel for Plaintiff

Reply to Counterclaim.

(Filed June 14, 1943.)

Plaintiff, Ostby and Barton Company, for its reply to the counterclaim heretofore filed herein, alleges:

1. Plaintiff admits the allegations of paragraph 8 of defendant's answer and counterclaim.

2. Plaintiff admits the allegations of paragraph 9 of defendant's answer and counterclaim.

3. Plaintiff admits the allegations of paragraph 10 of defendant's answer and counterclaim.

4. Plaintiff admits that on September 28, 1934, Thoger Gronberg Jungersen filed an application for letters patent in the United States Patent Office, Serial No. 745,893. Plaintiff denies the other allegations of paragraph 11 of defendant's answer and counterclaim.

5. Plaintiff admits that letters patent No. 2,118,468 issued to defendant, Thoger Gronberg Jungersen; plaintiff denies the other allegations of paragraph 12 of defendant's answer and counterclaim.

6. Plaintiff denies all of the allegations of paragraph 13 of defendant's answer and counterclaim.

7. Plaintiff, realleging all of the allegations of paragraph 5 of the complaint herein, admits the allegations of paragraph 14 of defendant's answer and counterclaim.

8. Plaintiff is without knowledge as to the allegations of paragraph 15 of defendant's answer and counterclaim.

9. Plaintiff admits that certain parties have accepted licenses under defendant's said letters patent No. 2,118,468 but plaintiff denies that such parties constitute "the jewelry industry in the United States" or that said industry has changed "from the accepted prior known

Reply to Counterclaim

methods of manufacture to defendant's patented process"; plaintiff is without knowledge as to the other allegations of paragraph 16 of defendant's answer and counterclaim.

10. Plaintiff denies the allegations of paragraph 17 of defendant's answer and counterclaim.

WHEREFORE, plaintiff demands judgment granting the relief prayed for in the complaint herein and dismissing defendant's counterclaim.

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John Vaughan Groner
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June 12, 1943.

Motion for More Definite Statement or for Bill of Particulars.

(Filed April 29, 1941.)

Now comes the defendant, Thoger G. Jungersen, in the above entitled cause and moves this Honorable Court for an order directing the plaintiff herein, Ostby & Barton, to serve a verified, more definite statement or a bill of particulars, which shall set forth in detail the following:

* * * * * * *

B. State details of Plaintiff's process referred to in paragraph 8 of the complaint particularly with regard to how rings of wax are produced * * *

* * * * * * *

MILFORD SALNY
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Karl W. Flocks
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Plaintiff's Particulars.

(Filed May 19, 1941.)

Comes now the plaintiff, in response to defendant's request B, for particulars, heretofore filed herein, and states:

The steps or operations employed by plaintiff in the manufacture of cast rings, are as follows:

(a) A metal mold comprising from three to five pieces, position within a two-piece aluminum mold frame of standard design, is built up around a master pattern
59 which may be made in any desired manner and of any desired hard metal;

(b) The master pattern is removed and melted wax is squirted from an eye dropper or syringe into a channel in the mold and thus into the mold cavities, which cavities correspond in shape and design to the master pattern;

(c) Upon cooling, the mold is disassembled and the wax pattern removed;

(d) A desired number of wax patterns, to which sprues or legs are still attached, are held in an upright posi-
60 tion in a rubber ring placed within a brass ring; a dental investment material possessing certain plaster-of-paris-like characteristics is poured to fill the brass ring, covering all of the wax patterns except the extremities of the sprues;

(e) After preliminary hardening the dental investment is fired for the purpose of further hardening and for the additional purpose of melting or burning out the wax patterns, thus leaving in the investment cavities corresponding in shape and design to the wax patterns;

(f) The investment is inverted and molten gold or other metal is poured into the cavity or channel formed

in the base of the investment by the rubber ring, and thence into the channels formed by the wax pattern sprues. In this condition the investment is placed beneath a dental compressing machine which employs compressed air to force the molten metal into all portions of the investment cavities;

(g) The investment is then placed in cold water which hardens the metal and disintegrates the investment;

(h) The gold castings are removed, their sprues clipped off and the molded rings polished and finished.

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Opinion.

(Filed May 7, 1946.)

MEANEY, District Judge:

This is an action for a declaratory judgment instituted under section 274 (d) of the Judicial Code (28 U. S. C. A. 400) and under the patent laws, and plaintiff seeks a declaration of invalidity and non-infringement of Jungersen Patent No. 2,118,468.

Defendant, Jungersen, the owner of the patent in suit, by counterclaim alleges infringement by plaintiff, Ostby
65 and Barton, of the said patent and seeks an injunction and an accounting for infringement of claims 5 and 6 of his patent.

The original controversy between the parties was founded upon an accusation by the defendant that plaintiff infringed the patent, and the complaint seeks a declaration of invalidity of the entire patent. In view of these circumstances, the issues to be considered will involve the entire patent and will not be confined to a determination of validity of claims 5 and 6 of the patent alone. The issue of validity having been raised initially, the court is of the opinion that the validity of the entire
66 patent becomes a question of general importance and should be considered and determined.

At the initial stages of this case American Associates, Inc. moved to be added as a party plaintiff and on a showing of its acquisition of all of the assets of the plaintiff corporation the motion is granted.

The patent in suit relates to a method of casting articles of intricate design and a product thereof and is concerned primarily with casting articles of jewelry, rings, and the like, of intricate detail, frequently designed with hollows, undercut portions and perforations. The patent has six claims, the first five of which are for a process and the sixth for a resultant articles of jewelry.

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Claims one to four of the Jungersen process are concerned with a method of casting articles of jewelry of intricate design. They involve the making of a model which may contain undercut surfaces, hollows or perforations. The model is placed on a base and a primary mould of rubber is built around it with the top surface forming a parting line. The mould is then vulcanized and forms a permanent shape.

The model is then removed and a suitable quantity of molten wax or other low temperature fusing material *is cast under applied force by rotating in a centrifugal casting machine, the centrifugal action thus forcing the wax into the mould and displacing the air, thereby filling the finest cavities completely.* 68

The two sections of the primary mould are then separated. The flexible rubber mould permits the wax pattern to be withdrawn without injury to undercut surfaces or delicate parts. The wax pattern is then invested in a material such as plaster of Paris forming a secondary mould. The nature of the investment material is such that it closely surrounds the surface of the wax pattern and after removal of the pattern from the hardened mould, the cavity remaining is a practically perfect reproduction of the wax pattern and the original model. 69

After investment, the plaster mould is subjected to sufficient heat to melt the wax without in any way affecting the cavity thereby produced. The molten precious metal is then cast centrifugally in the secondary or plaster mould and finally the mould is separated from the final casting. The resultant product is an exact replica of the original model, requiring only that the sprue be removed and the piece polished.

Claims five and six of the patent are for a method of casting and a resultant article thereby obtained. Claim five involves a method of casting an article of jewelry or a part thereof of intricate design having one or more

small projections or depressions, "comprising first producing" a model of the article to be cast, then forming about said model a primary mould, then removing the model from the primary mould, then introducing into the mould *by force sufficient to deposit the material into the depression or depressions of the primary mould, molten wax or other material of low fusing point* that will not injure the primary mould, to form a pattern and employing the pattern so made for the manufacture of a casting mould.

Prior to the Jungersen patent disclosure, the only known and generally practiced processes in the jewelry casting art were the "Cuttle fish" and "sand" casting methods. Neither method was efficient and admittedly each was inferior to the method disclosed in the patent in suit. Under these prior methods the castings were without detail and required extensive hand tooling and chasing by a master artisan, thus greatly increasing the cost of the completed article. The Jungersen method reduces to a minimum the necessary hand finishing of the cast article and makes possible the reproduction in any desired number of *exact replicas* of the original model.

The plaintiff, seeking a declaration of invalidity of the entire patent, contends that the Jungersen patent is fully anticipated in prior patent and prior publication disclosures (in non-analogous casting arts) as well as by several asserted methods allegedly in public use in both analogous and non-analogous arts.

It is evident from a review of prior patents and publications in the sculptural and industrial casting arts that reproductions of original models or pattern by casting method is of ancient practice. Thus, *Cellini* in the 16th century taught the use of a multi-part mould and the "lost wax" process. Similarly, the making of a primary mould about the original model of a flexible mould form-

ing material or in sectional parts is revealed in patents to *Spencer*, No. 748,996, *Haseltine* (Br. 2467), and *Krabuel* 1,238,789. The same steps are taught in publications of Cellini and in the translation of La Gravure and are employed in the Slatis-Dee ring casting method as described by Slatis, and in the Austenal method for dental casting. The same prior disclosures and patents teach the "lost wax" process.

Prior patents to McManus No. 1,457,040 and Perry No. 1,121,659 describes the use of centrifugal force in casting molten metal for the final reproduction. Use of centrifugal force is also revealed in publications on die casting methods and its use is asserted in the Slatis-Dee and Austenal methods.

It is evident that many of the steps employed in the Jungersen patent are old and were known in other casting arts. But the utilization of centrifugal force to introduce the molten wax into the primary mould is a new step in any art. The use of centrifugal force to cast the primary pattern is not only new, but it is a vital component to the success of the Jungersen method.

It is important to note that in none of the non-analogous sculptural and industrial arts was a high degree of exactness required in reproducing intricate design to the finest detail, and a reading of the prior art would not of itself be sufficient to enable one skilled in the art to perform the requisites of the jeweler's trade.

It was not until Jungersen added the additional step of casting the wax pattern in the primary mould by the use of centrifugal force, that jewelry casting became a practically and commercially successful art.

Since the additional step used in the Jungersen patent is new, it represents an advance over any prior art and is a distinct advance in the jewelry art. Since the patent is found to be novel, the question remains whether it is patentably so. In determining validity, the question

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at issue is not whether the method proposed is better or more efficient; the requisite of patentability is the exhibition or manifestation of imaginative inventiveness sufficient to raise the alleged invention from the handmaiden state of improvement to the higher status of inspired discovery and application.

The fact that the Jungersen patent is in part a combination of old elements, to which a new element has been added, is not ground upon which to deny validity. However, to find the patent valid, the additional step must
77 involve more than the exercise of mere mechanical skill. Thus, in *Textile Machine Works v. Hirsch Co.*, 302 U. S. 490, 497, the Supreme Court stated:

> "The addition of a new and useful element to an old combination may be patentable; but the addition must be the result of invention rather than the mere exercise of the skill of the calling, and not one plainly indicated by the prior art."

See also *Electric Cable Joint Co. v. Edison Co.*, 292 U. S. 69, 79; *McIvor v. Chemurgic Corporation*, 104 F. (2) 58.

In the present case, the prior knowledge was in the field of non-analogous casting arts. The end results re-
78 quired in those arts were dissimilar to those in the jewelry art. To arrive at a satisfactory result, both the means employed and the results obtained by Jungersen, were novel. The combination of partly new and partly old elements is patentable where the product obtained and the method used therefor are novel and the development thereof implied the exercise of inventive imagination beyond the skill of the trade. *Tumbler v. Baltimore Paint & Color Works, Inc.*, 11 F. Supp. 183.

Insofar as claims 1 and 4 are concerned, in the view of the Court, the Jungersen patent discloses that "flash of creative genius" sufficient to provide the basis of patentability, and it is no argument for invalidity to assert

that the use of centrifugal force is the mere substitution of equivalents which do substantially the same thing. 79

Thus, while the common knowledge and skill of the art is determinative of the sufficiency of anticipatory references, if the fictitious person of the patent law, the person possessed of the common knowledge and skill of the art, is unable to practice the purported invention by resort to the cited references and without resort to the patent in suit, the cited references are insufficient to negative novelty. See *De Cew v. Union Bag & Paper Corporation*, 57 F. S. 388, 397.

In contending for invalidity, plaintiff has relied extensively not only upon prior patents and publications, but upon the two asserted prior uses of Slatis and Austenal. Insofar as the Austenal use is concerned, extensive comment need not be made. The Austenal use or method was for dental casting. Its degree of success is questionable, but in any event, it adds little to the teachings of the prior patents and publications and did not employ centrifugal force in casting the wax pattern. 80

The asserted prior use by Slatis, however, requires farther comment. The method or use, as described by Slatis, was for jewelry casting and primarily for the casting of rings. The Slatis method undoubtedly involved, with slight modification, all of the steps disclosed in the Jungersen patent, including casting of the wax pattern centrifugally on a "home made" machine. But whether or not the Slatis method anticipates the Jungersen patent need not be passed upon, nor need this Court concern itself with the nature of the proofs adduced, for it is evident that the Slatis method was never in prior "public use" and that Slatis was not a "first inventor." 81

Insofar as he was able, Slatis kept his method a secret. He did exhibit finished rings and disclosed that they were made by a casting process, but he "never disclosed" his

82 method or taught his process to anyone. On examination Slatis stated:

> "Of course I never told anybody it is made by such a process * * * I kept my process a secret."

While employed with the Dee Company to conduct experiments, Slatis testified that he worked in a private room to which no one had access; that he kept his things in his own safe to which no one had the combination. On leaving the Dee Company, Slatis stated that "I took the secrets with me." On several occasions Slatis stated 83 that his method was never put on a commercial basis. He testified several times that he had kept his process secret, that he never taught his process to anyone and products of his method never went on the market. Thus it is evident that Slatis kept his method concealed, disclosing only the result of his process to a limited number of persons.

Such use obviously is not a "public" one and such an inventor is not a first inventor. The doctrine is now well settled that one who had earlier conceived the same invention could defeat a later patent only if he had in some way made public his results. The compelling rea- 84 son for such a conclusion seems to be that what does not in fact enrich the art, should not avail. *Gillman v. Stern*, 114 F. (2) 28, 31; *Alexander Milburn Co. v. Davis-Bournonville Co.*, 270 U. S. 390. The mere showing that someone had earlier conceived the same invention, but concealed and kept secret its use, will not suffice to anticipate a patent for the same device thereafter discovered. *Hall v. Bird*, Case No. 5,926 (11 Fed. Cas. 211); *Gayler v. Wilder*, 51 U. S. 476.

It is my opinion that claims 1 to 4 inclusive of Jungersen patent No. 2,118,468 are valid. This finding of validity and patentability is further buttressed by two U. S. District Court decisions in which this same patent

was found valid. *Jungersen v. Jenkins, et al.*, 30 F. Supp. 615; *Jungersen v. Morris Kaysen Co.*, 31 F. Supp. 703. These prior adjudications, while not binding upon this court, are entitled to great weight. *Standard Brands v. National Grain Yeast Corp.*, 101 F. (2) 814, 816 (C. C. A. 3). In addition to the above, patentability is further supported in the grant of patents by the United States and British patent offices. Many of the patents relied upon by the plaintiff were before the patent examiner.

Any remaining doubts that might linger as to novelty and validity would be resolved in favor of the defendant in view of the evident commercial sucess of the Jungersen process of which there is ample indication. *Arteraft v. Gotham*, 72 F. (2) 47.

While claims 1 to 4 inclusive are found to be valid, it is my conclusion that claims 5 and 6, in the light of the prior art, and more particularly in view of Kralund patent No. 1,238,789, are anticipated and invalid.

Defendants, contending for novelty and validity, assert that claims 5 and 6 clearly and specifically claim the use of an applied force in depositing molten wax into the primary mould, thus in effect seeking to establish that step as a novel element in the claimed process, or else, by implication, they ask the Court to read the use of centrifugal force into the specifications of claims 5 and 6. The former contention must fail since the application of "*force sufficient to deposit the material*" as specified in claim 5 is similarly taught by the prior patent to Kralund.

In his specifications Kralund instructs the making of the primary pattern by "*forcing molten material having a low fusing point into a metal mould or die under sufficient pressure to insure the filling of said mould or die.*" Kralund thereafter invests the pattern in a mass of plastic material and generally follows the steps known to the art.

88 *Opinion*

Neither may the use of "centrifugal force" to deposit the material be read into and made a part of the specifications of claims 5 and 6. Claims of a patent are independent inventions and each constitutes a separate grant of monopoly. Each claim must be considered by itself both with respect to validity and infringement. One may be valid and the rest invalid. *Wire Tie Machine Co. v. Pacific Box Corporation*, 102 F. (2) 543; *Sanitary Dist. of Chicago v. Activated Sludges, Inc.*, 90 F. (2) 727; C. D. 302 U. S. 736.

89 Neither may defendants construe claims 5 and 6 narrowly in order to preserve validity and broadly to secure a finding of infringement. *De Cew v. Union Bag & Paper Co.*, (supra). It has been stated that a claim which is capable both of broad and narrow construction in the light of the specification will be given that construction which sustains the patent. But where, from the specification or history of the application or language of the claim, it is clear that the patent office intended to grant the broader monopoly which turns out to be invalid, the courts will not for the arbitrary purpose of saving the claim read into it a limitation which it does not have. *Aluminum Co. of America v. Thompson Products, Inc.*,
90 122 F. (2d.) 796.

It is noteworthy that while many of the patents cited by the plaintiff in contending for invalidity, appeared in the file wrapper before the patent office and before the Courts in prior adjudications (supra), the Kralund patent is inserted as an alleged anticipating patent for the first time in present action.

In view of Kralund, it would appear that claims 5 and 6 amount to little more than an adaptation of an old process to a new use, clearly indicated by the prior art, and do not amount to invention. *General Electric Co. v. Jewel Incandescent Lamp Co.*, 47 F. Supp. 818.

Thus, while it is the Court's view that the utilization of

centrifugal force to introduce molten wax into the primary mould as described in claims 1 to 4 inclusive, is patentable invention, the mere specification of "force sufficient" as set forth in claims 5 and 6 fails to acheive that distinction in the face of the plain indication of the prior art.

In view of these conclusions, only brief comment need be made on the charges of infringement. At the outset of this action, counsel for the defendant stated that the question of infringment involved only claims 5 and 6. No contention has at any time been made that plaintiff's process infringes upon claims 1 to 4 inclusive.

The issue of infringment being confined to claims 5 and 6 only, the Court's finding of invalidity of those claims necessarily results in a conclusion that plaintiff, Ostby and Barton, does not infringe upon the Jungersen patent. This conclusion likewise makes unnecessary any finding by the Court into the charges of inequitable conduct directed against the other by both parties to this suit.

Through the consideration of the validity or non-validity of the various claims involved in the instant case, there has predominated the idea that patentability is a vexatious question, not determinable by an unyielding standard of easy application. Theories concerning it 93
have varied through successive decades, at times easy acceptance of tenuous claims being succeeded by rigid requirements, which tended to discourage research and experimentation.

The yardsticks applied by various courts, differed in their inventiveness almost as completely as did the inventions that were submitted for appraisal.

With all courts assuming that invention implies the production of novelty through the exercise of imagination and controlled by the announcement of the Supreme Court that there must exist "a flash of creative genius, not merely the skill of the calling" the task of practical application of these principles is never an easy one.

94 *Findings of Fact and Conclusions of Law*

Whether or not a flash of creative genius is revealed in any specific situation, depends on a number of factors, the sum total of which must serve to convince the court of the existence of the phenomenon of creative novelty. In its construction of these principles, the court has arrived at its stated conclusions.

An order may be entered in accordance with the views above expressed.

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95 **Findings of Fact and Conclusions of Law.**

Findings of Fact.

(Filed May 15, 1946.)

1. Plaintiff, Ostby and Barton Company, is a corporation organized and existing under and by virtue of the laws of the State of Rhode Island and is a citizen and resident of that State.

2. Defendant, Thoger Gronberg Jungersen, is a citizen and resident of the State of New Jersey.

96 3. This is an action for a declaratory judgment involving Jungersen patent #2,118,468, brought by Ostby and Barton against the patent owner, Jungersen, under section 274 (d) of the Judicial Code (28 U. S. C. A., s/s 400) and under the Patent Laws of the United States.

4. Defendant, Jungersen, by counterclaim, alleges infringement by Ostby and Barton of the patent in suit, and seeks an injunction and an accounting for infringement of claims 5 and 6 of his patent.

5. The original controversy between the parties was founded upon an accusation by Jungersen that Ostby and

Barton Company infringed the patent in suit. The complaint here seeks a declaration of invalidity of the entire patent, and the validity of the entire patent is here in issue.

6. American Associates, Inc., has moved to be added as a party plaintiff and has shown sufficient grounds therefor, to wit, its acquisition of all of the assets of the plaintiff, Ostby and Barton.

7. Defendant is the owner of Jungersen patent No. 2,118,468 here in suit, and has been since its issuance. 98

8. The Jungersen patent, containing six claims, relates to a "Method of Casting Articles of Intricate Design and a Product thereof", and is concerned primarily with the casting of Articles of Jewelry such as rings, and the like of intricate detail, frequently designed with hollows, undercut portions and perforations.

9. The first four claims of the Jungersen method involve the making of a model of wood, metal or other suitable material, such model having any number of undercut surfaces, hollows or perforations of any desirable kind. The model is placed on a base and a flexible mold-forming material, such as rubber, is built around the model, the top surface being arranged to form a parting line. The mould is then vulcanized and caused to flow intimately about the detail of the model and assuming a permanent mold shape. 99

The model is then removed and a suitable quantity of a very low temperature fusing material, as wax, is cast under applied force by rotating in a centrifugal casting machine, the centrifugal action thus forcing the wax into the mold and displacing the air within the mold, filling the finest cavities completely.

The flexible rubber mold permits the wax pattern to be withdrawn without injury. The pattern is then invested

in a material such as plaster of Paris. The mold thus built up by the investment is then subjected to sufficient heat to melt out the wax and the precious metal is cast into the cavity remaining by centrifugal force and finally the plaster mold is separated from the casting. The cast product is an exact replica of the original model, requiring only that the sprue be removed and the piece polished.

10. The Jungersen patent instructs that the primary mold instead of being of rubber may also be formed
101 in separatable sections of plastic materials capable of assuming intimate contact with the intricate designs. The process also provides for the use of a low fusing material, such as woods metal, in place of wax, when the pattern is cast in the primary mold.

11. The Jungersen casting method is the first process to reproduce successfully in full detail intricate and finely made pieces of jewelry, rings and the like, whereby the cast article does not require extensive chasing or hand tooling, other than polishing and removal of sprues.

12. No prior patent discloses any method designed primarily for the casting of intricate pieces of jewelry
102 and the like. Two prior methods are disclosed, whereby an effort was made to employ casting methods in the reproduction of rings. Thus, the Slatis-Dee Method and the means employed by the Kaspar-Esh Company were designed to reproduce rings by a casting process.

13. Prior to the Jungersen patent, the only known and successfully practiced casting processes in the jewelry trade were "cuttle-fish" and "sand" casting. Neither was an efficient method, and rings so cast were without detail and required extensive tooling and workmanship by a Master artisan before there was a completed ring.

"14. The Jungersen process is admitted to be far superior to either "cuttle-fish" casting or to "sand" casting.

15. The Jungersen method of casting reproduces intricate pieces having undercuts, hollows and perforations without loss of detail and in exact duplication in any number, and reduces to an absolute minimum the skilled labor necessary to a finished product.

16. The reproduction of original models or patterns by casting is an ancient art and many of the steps disclosed in the patent in suit have been used and are well known 104
in the casting art. Thus, Cellini in the 16th century teaches the use of a multi-part original mold and the "lost-wax" method.

17. The method of making the primary mold about the original model of either flexible mold forming material, such as rubber, or in sectional metal parts, is revealed in prior patents to Spencer #748,996, Haseltine (Br) 2467, and Kralund 1,238,789.

18. The same method is taught in publications of Cellini, La Gravure, and is asserted in the Slatis-Dee Method and The Austenal dental casting method. 105

19. The above prior patents and publications likewise instruct in the casting of a wax pattern which is subsequently invested in plaster of Paris or a like material to form the secondary mold which thereafter is subjected to heat to melt out the wax. This method, known as the "lost-wax" process, is also found in the Slatis-Dee and Austenal uses.

20. Similarly, the use of centrifugal force in casting is found in prior patent disclosures and in prior publications. Thus, *McManus Patent* 1,457,040 describes an electric centrifugal casting machine. In *Perry Patent* 1,121,659, centrifugal force is likewise used for metal

casting. Publications on Diecasting methods and the Slatis-Dee and Austenal dental methods also used centrifugal force.

21. It is evident that many of the elements employed in the Jungersen patent were known and old in other casting arts, but it nowhere appears in any prior disclosure that the element of applied centrifugal force was utilized to force molten wax into all the cavities of the primary mold.

107 22. None of the prior patents or prior publications had for their object the casting of jewelry or objects of intricate design, where fineness of intricate detail was a vital component in the final casting. To this extent the prior art was a non-analogous art, the concern there being in the casting of large bulk generally associated with the sculptor's art and with commercial casting in bulk.

23. The Austenal method was employed in dental castings the objects of which are dissimilar to those requisite in the casting of jewelry and the like. The Austenal Method teaches the injection of molten wax into the primary mold by squirting it with an eye dropper. Its success was questionable and the finished wax pat-
108 tern required further workmanship before investment. Thus, it failed to teach the most vital component to the casting of objects of intricate detail, and fails to enlarge upon the teachings of the prior art.

24. The Kaspar-Esh method for jewelry casting employed a dental casting machine to cast metal, but in making the wax pattern, the molten wax was poured from a spoon into the primary mold. The method was unsatisfactory and casting was abandoned.

25. The Slatis-Dee method, as described by Slatis, was undoubtedy similar to the method disclosed in the Jungersen patent, including all the steps in general, and including the casting of molten wax by centrifugal action.

26. The Slatis-Dee method, however, never was used commercially and the process whereby rings were cast by Slatis was never made public and was intentionally kept secret by Slatis. While Slatis was employed by the Dee Company to conduct experiments in jewelry casting, the method and process employed was never disclosed even to his employers.

27. Demonstration and commercial success attest to the success of the Jungersen method of jewelry casting. Such methods, resulting in the reproduction to the finest detail of intricate pieces of jewelry, are the first to be 110
completely satisfactory, and result from the combination of steps described in the Jungersen patent.

28. Of primary importance and vital to the exact reproduction of the original model to be cast, is the detail of the wax pattern. Loss of detail to any degree in the wax pattern necessarily results in an inexact final reproduction.

29. The use of centrifugal force in the introduction of wax or other low fusing material into the primary mold, produces a wax pattern which is the replica in every detail of the cavity in which it is cast, notwithstanding the fact that the model may be of intricate design having 111
hollows and undercuts.

30. In no prior patent, in no prior publication, and in no method known to the trade or accessible to the public, was centrifugal force employed in the introduction of wax into the primary mold.

31. Claims 5 and 6 of the patent in suit provide for the formation of a primary mold and the introduction of molten wax or other low fusing material into the depressions of such primary mold by force sufficient to deposit it, without further specification of the type of force to be employed.

32. *Kralund Patent* 1,238,789 while relating to commercial castings and particularly castings of large bulk, suggests a similar method when he directs that the pattern be made "forcing molten material having a low fusing point into a metal mold or die under sufficient pressure to insure the filling of said mold or die * * *." Similarly, the Austenal method of dental casting suggests the use of an eye dropper by which wax was "squirted" into the rubber mold.

33. Reading Kralund with Spencer and Haseltine, the
113 method or process as claimed in claims 5 and 6 of the Jungersen patent is fully anticipated. Claims 5 and 6 must be found invalid in view of the teachings of those prior patents.

34. The method or process used by Ostby and Barton and alleged to infringe upon the Jungersen patent involves essentially the process in Claims 5 and 6. Under the Ostby and Barton process a multi-part metal mold is made from the original model, and a pattern is then made by melted wax being "squirted from an eye dropper or syringe" into the multi-part mold. Thereafter, the wax pattern is invested in a manner similar to
114 the remaining steps disclosed and well known in the art.

35. This method, if it infringed at all, would infringe on claims 5 and 6 only, and in view of the findings of invalidity of claims 5 and 6 heretofore, there can be no infringement.

36. The Spencer, Haseltine and Perry patents were before the patent office and rejected as anticipations when Jungersen patent was granted. Kralund patent does not appear in the file wrapper, and its consideration appears in this case for the first time as an alleged anticipation.

37. This very patent has been held valid in two prior adjudications in United States District Courts. In

neither of the prior adjudications was the Kralund patent before the Courts.

38. At the outset of this case, counsel for defendant, Jungersen, admitted that the Ostby and Barton method, if it infringed at all, would only infringe claims 5 and 6 of Jungersen patent.

39. The Austenal method is not found to anticipate, and the Slatis use is found not to have been such a "public use" as would enrich the art.

40. The Court makes no findings relative to the charges 116
of inequitable or improper conduct directed against the other by both parties to this action.

Conclusions of Law.

1. American Associates, Inc., is joined herein as a party plaintiff.

2. Claims 1 to 4 inclusive of Jungersen patent No. 2,118,468 are valid and not infringed.

3. The asserted Slatis-Dee use was not a "public" one and did not in fact enrich the art, and is not sufficient to anticipate the Jungersen patent. 117

4. Claims 5 and 6 of Jungersen patent No. 2,118,468 are invalid.

5. No valid claim of the said Jungersen patent is infringed by Ostby and Barton.

6. A judgment may be entered adjudging claims 1 to 4 inclusive of said patent No. 2,118,468 valid and not infringed, and claims 5 and 6 of said patent invalid.

7. The defendant or anyone in privity with him is enjoined from bringing or prosecuting or threatening to bring or prosecute any civil action charging infringement of claims 5 and 6 of said patent No. 2,118,468, against plaintiff, its agents, vendees or others in privity with it or them.

8. There will be no costs allowed either party.

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Order.

(Filed May 22, 1946.)

This case came on to be again heard upon stipulation of the parties, and it appearing that good reason therefore exists

IT IS ORDERED:

(1) That the Slatis Exhibits (P-3 through P-7) be returned to counsel for the plaintiff, to be returned by said counsel to Abraham Slatis, the owner thereof;

119 (2) That all other exhibits be returned to the offering party upon condition that said exhibits be produced in the Court of Appeals, if desired by the court or by either of the parties hereto, in the event appeal to said court is herein taken and perfected herein by either of the parties hereto.

Date: May 22, 1946

THOMAS F. MEANEY
United States District Judge

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Stipulation.

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It is stipulated by and between the parties, by their counsel, as follows:

(1) That the exhibits of each of the parties, heretofore introduced herein, are, except as provided below, pertinent to and required to be used in an action now pending in the United States District Court for the Southern District of New York, entitled, "Thoger Gronberg Jungersen v. Baden & Foss; etc." in Civil Action No. 24/221;

(2) That, the plaintiff having indicated its decision to proceed no further herein, or elsewhere, with the asserted Slatis prior use, the Slatis exhibits—i.e., plaintiff's exhibits P-3 through P-7—will not be used in said pending action, nor will said exhibits have any further use herein or in any appeal which may be prosecuted herein; 122

(3) That, the Court consenting thereto, the Slatis exhibits be returned to counsel for the plaintiff, for return to Abraham Slatis, the owner of said exhibits;

(4) That, the Court consenting thereto, all other exhibits herein be returned to the offering party upon condition that said exhibits be produced in the Court of Appeals if desired by the court or by either of the parties hereto, in the event appeal to said court is herein taken and perfected herein by either of the parties hereto. 123

Date: May 22, 1946

JOHN VAUGHAN GRONER

Counsel for the Plaintiff

Date: May 22, 1946

COOPER, KERR & DUNHAM by Drury W. Cooper, Jr.

Counsel for the Defendant

124 *Final Judgment*

It is further stipulated by and between the parties, by their counsel, that none of the parties hereto shall be limited because of the provisions of paragraph 2 of the stipulation of May 22, 1946.

Date: October 11, 1946

JOHN VAUGHAN GRONER

Counsel for the Plaintiff

Date: October 11, 1946

COOPER, KERR & DUNHAM by John N. Cooper

Counsel for the Defendant

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Final Judgment.

(Filed May 22, 1946.)

This cause having come on for trial before the Court, the parties appearing and the issues having been duly tried, and the Court having rendered its opinion and made findings of fact and conclusions of law, now, therefore,

It is ORDERED, ADJUDGED and DECREED

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1. That Claims 1 to 4 inclusive of Jungersen Patent No. 2,118,468 are valid;

2. That Claims 5 and 6, thereof, are invalid and void;

3. That no claim of said Jungersen Patent is infringed by the plaintiffs;

4. That the counterclaim filed by the defendant be, and the same hereby is, dismissed; and

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5. That defendant or anyone in privity with him is enjoined from bringing or prosecuting, or threatening to bring or prosecute, any civil action charging infringement of Claims 5 and 6 of said patent, No. 2,118,468, against plaintiffs, its agents, vendees, or others in privity with it or them.

Dated: 5/21/46

THOMAS F. MEANEY
U. S. District Judge

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Approved as to form:
JOHN VAUGHAN GRONER
By Counsel for Plaintiffs

DRURY W. COOPER
By Counsel for Defendant

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Notice of Appeal.

(Filed Aug. 21, 1946.)

Notice is hereby given that Ostby and Barton Company and American Associates, Inc., plaintiffs above named, hereby appeal to the Circuit Court of Appeals for the Third Circuit from all parts of the Final Judgment entered in this action on May 22, 1946 which ordered, adjudged and decreed Claims 1 to 4 inclusive of Jungersen Patent No. 2,118,468 to be valid, specifically paragraph 1 thereof.

131

JOHN L. MILTON, JR.
Attorney for Plaintiff
MILTON, MCNULTY & AUGELLI
1 Exchange Place
Jersey City 2, New Jersey

Of Counsel:

JOHN VAUGHAN GRONER
Fish, Richardson & Neave
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New York 5, New York

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Notice of Appeal.

(Filed Aug. 22, 1946.)

Notice is hereby given that Thoger Gronberg Jungersen, the above named defendant, hereby appeals to the United States Circuit Court of Appeals for the Third Circuit from paragraphs numbered 2, 3, 4 and 5 of the judgment in this action filed May 22, 1946 and entered on May 23, 1946.

GEORGE D. RICHARDS
Attorney for Defendant
605 Broad Street
Newark, New Jersey

Dated August 20, 1946

To:

Milton, McNulty and Augelli
Attorneys for Plaintiffs
1 Exchange Place
Jersey City 2, New Jersey

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Transcript.

Appearances:

For the Plaintiff:

Messrs. Milton, McNulty & Augelli, By John L. Milton, Jr.

Messrs. Fish, Richardson & Neave, By John Vaughan Groner, Esq., John B. Cuningham, Esq.

Messrs. Edwards & Angell, By Edward Windsor, Esq.

For the Defendant:

137 George D. Richards, Esq.

Messrs. Cooper, Kerr & Dunham, By Drury W. Cooper, Esq., John N. Cooper, Esq., Karl W. Flocks, Esq.

Tried before Honorable THOMAS F. MEANEY, Judge, at the Federal Building, Newark, N. J., on Tuesday, October 23rd, 1945, at 10 A. M.

* * * * * *

Mr. Cooper: Now, if your Honor please, this action arises originally on a bill to declare the patent that becomes the patent in suit, that is the patent of Jungersen, 2,118,468, invalid. The defendant filed as a counterclaim a charge of infringement, and I am not sure of your 138 Honor's desire as to the procedure. In some jurisdictions under pleadings of this sort, the defendant has gone ahead just as though it were an ordinary patent suit, and the plaintiff has become in effect the defendant. I am not sure of your Honor's desire.

Mr. Groner: The plaintiff has no inclination at all. We are entirely willing to follow your Honor's wishes.

The Court: * * * Suppose we follow the ordinary practice and have the defendant proceed.

Mr. Cooper: All right.

The Court: Is that satisfactory?

Mr. Groner: Yes.

* * * * * *

Mr. Cooper: * * * I offer a copy of the Jungersen patent, 2,118,468, in evidence.

(Received and marked Exhibit D-1.)

Mr. Cooper: * * * As appears in the pleadings of the case, Mr. Jungerson is still the owner of this patent.

Mr. Groner: No question raised on that score by Ostby & Barton.

The Court: When you refer to Ostby & Barton we might as well have it understood now that in the event the Court rules finally that the assignee company may be joined as a party plaintiff, any admission made for Ostby & Barton will be considered made also for that company.

Mr. Groner: Certainly.

The Court: Very good.

* * * * * * *

Mr. Cooper: * * * I will offer in evidence the bill of particulars of the plaintiff which describes the steps or operations employed by the plaintiff in the manufacture of cast rings. Shall I read that to your Honor?

The Court: No, I think you may just file it.

* * * * * * *

The Clerk: The bill of particulars will be marked D-2 in evidence.

(Received and marked Exhibit D-2.)

Mr. Cooper: Well then, the depositions of Raymond E. Ostby, Royal J. Gregg, and Alfred E. Dixon taken at Providence on April 5, 1944, and the exhibits identified in connection therewith, P-1, P-2, P-3 and P-4 are offered in evidence.

The Court: All right. Mark them as one exhibit. Put them in an envelope and mark them as one exhibit.

(Received and marked Exhibit D-3.)

Mr. Cooper: Now, I want to state the point that appears from the bill of particulars and from these depositions, which is that they show that Ostby & Barton have

infringed only on claims 5 and 6 of the patent and not on claims 1, 2, 3 and 4. So that the suit is confined, as I understand it, to claims 5 and 6.

Mr. Groner: May I interrupt you, Mr. Cooper, there?

Mr. Cooper: Yes.

Mr. Groner: Pardon me, your Honor. The suit, despite that admission of non-infringement, concerns all six claims of the patent in suit. This is a declaratory judgment action.

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GEORGE SHAW, called and sworn on behalf of the defendant, testified as follows:

Direct Examination by Mr. Cooper:

Q. Where do you live, Mr. Shaw? A. In Toronto, Canada.

Q. And have you always lived there? A. No, I lived there for twenty-three years. I was born in Scotland.

Q. What has been your life work or your occupation? A. Twenty-two years I have been a jeweler; for the last
144 eleven years I have been a manufacturer; previous to that I was a working mechanic in various shops.

Q. Always connected with the jewelry trade? A. That's so.

Q. And always at Toronto? A. Correct.

Q. And what is the name of your firm now? A. Libman & Shaw.

Q. And they are manufacturing jewelers? A. That's correct.

Q. And of what size? Can you give me some idea of the size of the firm? A. Well, in Canada I suppose—I know we are rated as a fairly large concern in our own field; that is to say, we make exclusively diamond jewelry, diamond mounts and gold and platinum.

Q. And including rings? A. Including rings; principally rings, as a matter of fact.

Q. Do you know a man named Goldsmith in Canada? A. Yes. From the Goldsmith Company I obtained a license to operate, as I understand, Mr. Jungersen's casting process.

Q. When was that, that you obtained the license? A. In the fall of 1935.

Q. And what did that license you to do? Describe the process. A. To make a model as accurately and skillfully as possible, to form a rubber mould around that model 146

. . . . . .

and cast centrifugally wax into the rubber mould, invest the pattern, in dental investment, and cast the metal centrifugally into the mould.

Q. Now what do you mean by investing the pattern? Go a little farther with that, please. A. We form the pattern—we set the pattern on a sprue or former, covering, surrounding, the same with a brass of cylindrical tube; the investment is mixed to the proper constituency, according to our formula, and poured in, at the same time being vibrated.

Q. In what way did you vibrate? A. Originally we had 147
a crude vibrator—it was merely a slab of wood mounted on a pulley. We graduated from that to a vibrator set mechanically.

Q. And what is the object or purpose of the vibrator? A. To remove the air. In this way—our type of jewelry is rather intricate and of very fine design, and the air is very easily and readily trapped into those pierces and openings. By vibration we aid, to a great extent, almost completely in eliminating the air.

The Court: From the investment?

The Witness: From the investment and the surrounding model, wax model.

Q. And when was it, about, that you took this license from Mr. Jungersen's patent? A. In the fall of 1935; I think, if I am correct, in December of 1935.

Q. And to what extent have you practiced that process since? A. At my plant we completely eliminated all other methods. We, prior to that, used the regular methods known to the jewelry trade—sand casting and * * * cuttle fish casting.

Q. Cuttle fish casting? A. Yes, sir.

Q. That's taking a cuttle fish bone? A. A cuttle fish
149 bone and sawing it in half, flattening the two surfaces. Of course, we first made a model. This model was an entirely different type than the model we use today, inasmuch as there was no detail; we merely had a coring —we cored the inside of the head from the back and we compressed the model between two pieces of cuttle bone, obtaining an impression. In this impression we cast metal by the gravity method with a torch melt.

Q. Well, what did you do after your cuttle fish bone proposition was ended? A. We removed it, we removed the sprue, proceeded to file it all over, make it symmetrical, because, as is common knowledge in the jewelry trade, cuttle fish casting is not an altogether fine casting,
150 it is far removed from casting as we know it today. We removed the roughness, we marked a design on this casting, we drilled it and pierced it and hand fashioned it almost completely by hand—in fact, completely by hand—after it was cast.

Q. Well, what character of labor was required for that type of work? A. A very highly skilled type of jewelry mechanic was required to make a fine piece of jewelry from this type of casting.

Q. Somebody with special ability? A. Well, I would say the higher class mechanic, as we understand jewelry mechanics.

Q. Yes. Well, in what other way had you made rings before? A. In sand casting.

Q. And tell about the sand casting. A. The sand casting process is generally similar to the cuttle fish casting inasmuch as you have a frame in which you create an impression by impressing first of all your models on your flat surface. The models for sand were cast on a flat basis, on a flat plane; they weren't cast cylindrical, in other words. In our type of casting with sand, we cast in sand principally the gent's style of signet ring and stone ring. The model was placed flat, the frame was applied around it, the sand was applied and pounded to the proper constituency; the model was reversed and the other half of the frame was applied, the sand was again pounded to the proper constituency and an opening or gate or sprue cut to permit the metal to be poured in in the same manner as before with straight gravity pour. 152

Q. Well, after you had poured into the mould and the metal had become hard, what was then done? A. Well, we had a casting that had a general all surface which was uniform inasmuch as the roughness was uniform and the difference from a cuttle fish casting and sand casting was that your straight compressed surfaces, that is to say, your parallel surfaces, were naturally much better than your surrounding surface or your top surface, because the action of the compression didn't take place there; whereas in sand casting, or for this particular type of work, it was superior inasmuch as you had a uniform surface which was still quite rough and had to be filled, rounded, brazed and completed in the usual Jeweler's process. 153

Q. By the same high type of workmen as before? A. Yes.

Mr. Groner: Mr. Cooper, would we save any time if Osthy & Barton admitted that, for the purpose

154 *Defendant's Witness, George Shaw, Direct*

of jewelry casting, the method outlined in the patent is superior to cuttle fish or sand casting?

Mr. Cooper: I am glad to have the admission.

Q. About how many castings do your make by this Jungersen process? A. Well, the number of castings, of course, is limited only by your requirement. It is just a matter of reproduction. In our own plant we use it exclusively at the present time. We average 1500 to 2,000 castings a month. Is that an answer?

155 Q. Yes. When you made the license with Jungersen, were there other licensees in Canada? A. I made no license with Mr. Jungersen; I made my license with the Goldsmith Company of Canada.

Q. Oh, yes; it had the rights from Jungersen, as you understood it. A. That's correct.

Q. Yes. And when you made your license with the Goldsmith Company under the Jungersen patent, were there other licensees in Canada? A. To my knowledge there were, I think, three other persons who were licensed to do this type of casting.

Q. And at the present time what is the status in Canada, if you know? A. It is almost completely used in
156 all manufacturing jewelry plants.

Q. Under license, under the Jungersen patent? A. From the Goldsmith Company.

Q. Yes. Is there a way by which rings may be finished completely in one act or operation? What I have in mind is the striking dies that you did not mention before. A. Well, striking is something in Canada we don't use nearly to the extent that they do in America, because of the high cost of the dies. We have a very limited production in our country, and striking dies for an intricate piece of gold jewelry are very expensive, and for our limited production practically prohibitive.

The Court: Well, by striking dies can you in one process produce the ring?

The Witness: No, your Honor. In a die-striking process you strike the pieces and make an assembly. The assembly can be up to as many as five or six parts, from two parts to five or six parts, which are brazed together by hand.

Q. Well, what is the approximate cost of a die for an intricate ring? A. Well, to the best of my knowledge, for intricate rings it would run five hundred to several thousand dollars, the cost of the die. 158

Q. Now, what is the cost in labor and material of the Jungersen process from beginning to end? A. There would be a slight variation on the intricacy of the model to be created because those models are created entirely by hand; it is a very highly skilled operation, but it would run from, in my labor costs, thirty to sixty dollars—$30 for a simplified design to approximately $60 for a complicated design.

Q. That is, to make the original model? A. The model. After that it is a matter of a few dollars to complete the operation, to make the waxes for production.

Q. A few dollars? A. Yes, sir.

Q. Well, just what do you mean by that? A. Well, we 159 figure a mould costs us about two dollars and a half to make, and the rest of the materials involved are wax and investment, which are standard things; we figure something, I think, like two and a quarter cents to invest three rings in an investment, and to reproduce the gold ring after. Your large cost is in the model, which, of course, we write off on our production.

Q. Yes. But the rest of it is only— A. Yes, it is quite nominal.

Q. Quite nominal. Now, have you had experience in the United States, Mr. Shaw, with various jewelers here?

160 *Defendant's Witness, George Shaw, Direct*

A. Well, at different times I have had an entree into various plants in New York through different connections I might have. In 1935 I was here and visited several plants. At that time I showed them castings that I had made in gold.

Q. That is, castings made by the Jungersen process? A. That's correct.

Q. And as a result of that, what happened in the United States, so far as your knowledge went? A. Well, in some instances, these were considerably larger manufacturers,
161 they were quite skeptical that such a casting could be made; they really thought that I had a hoax or something, I don't know; that dies were the only method of making jewelry, nothing could touch dies, there was no casting method that they would consider. I come today and I find that the casting method is an almost exclusive process, taking the place of dies. I inquire from different manufacturers today there and they are very satisfied with something that a few years ago they didn't even want to consider, when I first arrived in '35.

Q. And that is what you denominated the Jungersen process? A. Correct.

Q. Did you ever contact a concern known as Rothman
162 & Baden, later Baden & Foss? A. Yes, Rothman, I had an experience—I was introduced to Mr. Baden, and Mr. Rothman; Mr. Baden is the gentleman I remember speaking to, and at that time he was showing those castings; he was using the same method, peculiarly, that I had hereto used myself. He didn't use dies; he had almost exclusively the cuttle fish method; and I talked it over with the gentleman and I showed him the improvements, because he was doing the same thing that I had heretofore done, and told him that I thought he should get a license or permission or start and operate on it; I told him benefits I had received from it.

Q. When was this, about? A. In 1935, sir, I think, or 36.

Q. Yes. A. I would say it was 1935.

Q. Now, I want to show you some photographs.

Mr. Cooper: May I have this marked for identification?

(Marked Exhibit D-4 for identification.)

Mr. Cooper: Would you hand that up to his Honor? It may be convenient for him to follow with this. May I step up to the witness stand, your Honor? 164

The Court: Yes.

Q. I show you this photograph of three objects over which are the superscriptions C-21, C-22 and C-23, this photograph having been marked for identification as D-4, and I will ask you this question. Assuming that C-23 is the original model, I will ask you whether, in your opinion as an expert in this field, C-21 and C-22 are made according to the Jungersen process from C-23. A. Well, of course strange things can happen, but in my opinion I can't conceive that anyone using a Jungersen method could make castings of that description.

Q. Explain your answer further. A. Well, in the first 165 place there is a lack of detail; there is a lack of sharpness; there is a lack of reproduction. In the Jungersen process we get absolutely, and I say absolutely, a reproduction of all the detail on our original model.

Q. Well now, can you point out to the Judge, putting the photograph up on the bench there, what you mean by the lack of similarity between C-23—

The Court: Well, I mean, if it can be conceded that these are fair representations of what they are supposed to represent, it is evident. It does not require an explanation. Have you seen these?

Mr. Groner: Yes, your Honor. I have no objection to these coming in and the witness testifying as far as he cares to.

The Court: All right. Well, I can see patently without need of any description.

Mr. Cooper: Yes. I might say in explanation that these are enlarged photographs of certain allegedly prior products on a prior use, and according to the witness up there, he made them according to the Jungersen process as he described it, and I am calling attention to the fact that apparently they are not made with that process. All right. Your Honor does not want to see the particulars?

The Court: I can see them myself without description.

Mr. Cooper: All right.

The Court: I can see a vast difference in the accuracy and sharpness of outline.

Mr. Cooper: I will mark another photograph for identification.

(Marked Exhibit D-5 for identification.)

Mr. Groner: You could save time, Mr. Cooper, if you just put these in. I am not going to offer objection to them.

Mr. Cooper: Well, I am doing it as rapidly as I can.

Mr. Groner: I meant to eliminate the "for identification." I shall make no objection to your offer in evidence.

The Court: Now, what is D-5?

Mr. Cooper: D-5 is another ring and model.

The Court: Well, let's see. C-2 represents the ring made according to what process?

Mr. Cooper: C-2 is the original model.

The Court: That is C-2 on D-5, the original model made according to what process?

Mr. Cooper: Well, it is the model that was premade from which castings were to be made.

The Court: Oh. All right.

Mr. Cooper: And C-5 is supposed to be the copies from C-2.

Q. Now I will ask the witness. A. You wanted me to criticize these in the light of the Jungersen method?

Q. Yes. A. As before. Well, I would claim, and emphatically claim—

Mr. Groner: I can't hear you, sir.

A. (Continuing) I would claim, and emphatically claim, that the reproduced casting is not by the Jungersen method.

The Court: Which one was that?

The Witness: The C-5.

The Court: On D-5.

The Witness: Yes; my explanation for that being simply, with all my knowledge and experience of centrifugal casting over a great many years now, the extreme end of the mould is the sharpest and best formed part of the mould. Even in the mould that may not be completed and that is not properly filled, the extreme end of the mould is always the sharpest and in best detail.

Q. By the extreme end of the mould you mean this part? A. Yes. The detail is lost. The sharpness is lost.

The Court: In C-5.

The Witness: Yes.

The Court: As compared to C-2.

The Witness: 2.

172 *Defendant's Witness, George Shaw, Direct*

Q. And that, you say, is an indication to you that that was not made according to the Jungersen process? A. Yes.

The Court: That which was? C-5?

Mr. Cooper: C-5. Now I will mark another photograph.

(Marked Exhibit D-6 for identification.)

Q. I show you still a third photograph, which has been marked D-6 for identification and on which are three
173 photographs of rings, C-16, C-17 and C-18. Now, according to the deposition, C-18 was finished by special handwork after having been cast. Now, the question I want to ask you is whether C-16 was made from C-17—or, no, whether C-17 was made from C-16. A. It is hardly conceivable. If it is reputed to be made from the Jungersen method, I can't possibly understand how it could be. Such a casting, if it is even this crude and all as this model is, would still reproduce itself accurately in the Jungersen method. The detail again is lost here. The piercings are filled in. It is ragged. It is rounded. It is rough. We don't have results like that with the Jungersen method, and obviously C-18 has been very
174 considerably hand touched. That is something else we don't do. We don't hand touch chasing or engraving on our work.

Q. * * * After the Jungersen casting has been made, it is finished? A. The engraving and chasing is finished by the polisher, and not by the jeweler, brazed and burnished; burnished and brushed and rouged in the regular polishing process. The jeweler doesn't touch it.

Q. But there isn't any handwork on the model itself? A. That is correct.

The Court: Simply polishing?

The Witness: Yes.

The Court: Without any alteration?

The Witness: Your Honor, this ring here is—

The Court: No, no. In the Jungersen patent.

The Witness: We have engraving and chasing.

The Court: But you have no reduction in the size or shape of it?

The Witness: Oh, yes. We have a shrinking action but we don't lose the detail, only inasmuch as it reduces in size. The sharpness remains. The design remains, but we have a regular reduction by shrinking from the original model, from the wax impression to each casting.

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The Court: What is that operation?

The Witness: It is a general operation.

The Court: It is not a mechanically induced thing by hand operation?

The Witness: No, sir. It is something that takes place in the process and it is taken care of in the construction of the model.

The Court: You allow for it?

The Witness: Absolutely.

* * * * * * *

The Court: All right. Now, this witness has testified that the difference seems to be based on a variation in the sharpness of outline and the accuracy of detail. That is what it is, is it?

177

The Witness: Yes.

The Court: Any other distinguishing feature that you can think of now except the sharpness of outline and the distinction of detail?

The Witness: Well, in this particular instance the finished ring has obviously been hand chased from the original casting. It is not varied in the other rings as there has been no hand operation.

Mr. Cooper: May I have a moment, if your Honor please?

You may examine.

178 *Defendant's Witness, George Shaw, Cross*

Cross Examination by Mr. Groner:

Q. Mr. Shaw, you spoke of your experience in the jewelry trade? A. Right.

Q. Have you had any experience in any other allied trades employing casting? A. No.

Q. Do you know anything about the method there used? A. Well, I am familiar to a certain degree with statuary casting.

Q. And how long have you been so familiar and what is the degree? A. I have a general knowledge that you
179 use the glue mould and—

Q. I beg pardon? A. That you use the glue mould or gelatin mould made of wax plaster base and insert the model of which they get impressions.

Q. You are quite familiar with the use of rubber moulds? A. Yes, I understand they use rubber moulds.

Q. You know that they use it? A. Yes.

Q. And you spoke of centrifugal force. Are you not also familiar with the fact that they have used centrifugal force in many other arts? A. I am familiar with the fact that they use centrifugal force in mechanical dentistry. Outside of that I never had any experience
180 in the use of centrifugal force only as I have mentioned.

Q. So you just don't know—

Mr. Cooper: I object.

The Court: I do not think that is a fair statement. He says he doesn't know about a lot of things in which centrifugal force may be used but he does know about the things that he has testified to.

Q. Now, with relation to what you call the Jungersen process and speaking particularly of the photographs D-4, 5 and 6, you said that with the Jungersen process you got exact reproduction. That is substantially correct, isn't it? A. Including the shrinkage.

Q. By allowing for shrinkage you got exact reproduction? A. That is right.

Q. In connection with the Jungersen process you start out with a metal model? A. Correct.

Q. And then you make, you said, a rubber mould around that model? A. Right.

Q. How do you make that mould? A. Well, we start again with a frame. We determine the split line of the model, that is to say the parting line. We immerse to one-half in the plaster. We have formed plaster in the frame around the model and determined the height of the split line. We vulcanize rubber on top in a regular 182
vulcanizer. We reverse it, clean it, and vulcanize the other half.

Q. And thus you get your rubber mould? A. Correct.

Q. Now, I am going to hand you a copy of Jungersen's patent, Exhibit D-1, which is the Jungersen patent in suit and I direct your attention particularly to page 1, column 1, line 33, bottom of the column, I ask you if you find there disclosed any such method as you have referred to:

Mr. Cooper: Well, I don't believe that this is a competent examination. I didn't ask the witness about the patent or the technical— 183

The Court: No, but he has referred to the exactitude with which replicas are made in the use of this patent.

Mr. Cooper: I have no great objection except for the time wasted.

The Witness: For your Honor's benefit, this is the first time I have happened to read this, so you don't mind if I take my time reading it?

The Court: Take your time; not too much time.

A. I cannot see that I have made any misstatement or misrepresentation of method according to this.

Q. I didn't say whether you had made a misstatement or misrepresentation; I asked you do you find in the patent a statement paralleling what you told me. A. Well, if you care to read it it is the same. I read it.

The Court: Will you tell us what you think?

The Witness: It is quite just what I said.

Q. Now, we will go a little further in that connection, Mr. Shaw. After you have formed the lower half of your rubber mould along the parting line to which you referred, you testified that you vulcanized. That is correct, isn't it? A. Yes.

185

Q. Do you find any reference there to that? A. It doesn't say vulcanize; it says form. I mean the forming can be vulcanized or it could be plaster. I cannot split hairs about that.

Q. Going a little further, it does speak of vulcanizing, doesn't it? A. I didn't read quite that far.

The Court: Well, point it out to him.

Q. The final paragraph in column 1 on page 1, "The mould thus constructed"— A. Excuse me, I would like to point out—you asked me to read it.

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Q. Just a minute. I am trying to answer the Court and you can come in in just a second. "The mould thus constructed—"

Mr. Groner: And if it please your Honor, that includes both the upper and the lower half.

Q. (Continuing)—"is preferably made of rubber and when the rubber material completely surrounds the model it is suitably vulcanized" and so forth. Now do you find any statement there that each half is separately vulcanized? Just confine yourself to what is here. A. Listen, I am a mechanic; I am not a patent attorney. I only have a process under which I operate; I operate according to instructions.

The Court: The question is, is there anything in this part that has been read, which you read yourself and which counsel just read to you, which would indicate that the parts would be vulcanized separately.

The Witness: Well, your Honor, to be quite frank, there is two ways: it could be volcanized in one operation; it could be vulcanized separately. We do it both ways. Does that answer your question?

Q. No, sir, it certainly does not.

The Court: It answers mine.

Q. Then I shall ask another question.

The Court: All right.

Q. If you take both parts and vulcanize them together, what do you do to keep them from flowing together during the flowing process of vulcanization? A. We have a parting powder.

Q. I see. Now, will you refer to the same part of the patent and tell me whether there is any reference there to a parting powder?

Mr. Cooper: To a parting what?

Mr. Groner: A parting powder, talc or something of that sort.

The Court: Don't waste any more time. There isn't in that particular part.

Q. Now, if you vulcanize your rubber parts, the one simply superimposed over the other, without any parting powder, the two parts do run together, do they not? A. Well, I wouldn't say they would, no.

Q. They would not? A. No.

Q. Then is this patent incorrect in stating in the last paragraph that during a vulcanization or the fact of vulcanization, "caused to flow intimately about the detail structure of the model and thus assumes a permanent

shape having a cavity the exact shape and detail of the model embedded therein."

Mr. Cooper: That is the last paragraph in column 1, isn't it, of the patent?

Mr. Groner: That is exactly correct.

A. That is correct. Whether or not, I don't know—I only obey instructions. I operate a process. I can tell you that the edge of the vulcanized mould, I don't know why—

The Court: It is suitably vulcanized, and the purpose of it is to keep them apart so they won't flow together.

The Witness: Your Honor—

The Court: All right. I have answered it to my own satisfaction.

Q. Mr. Shaw, if you vulcanize for too short a period what happens? A. Well, you are a very foolish person. You have specific instructions.

The Court No, what happens when you vulcanize for too short a period?

The Witness: You would get a poor mould. That is common sense.

Q. Does the patent tell you how long to vulcanize? A. No, but any rubber company will tell you.

The Court: No, just answer the question.

Q. Will you answer the questions and stop going outside of the questions?

The Court: Now, wait a minute—

A. I am a mechanic, my friend.

Q. Now we go on to another step, Mr. Shaw. If you don't make a perfect rubber mould what happens to

your pattern? A. The model is not harmed in any way. You can retake a model and reset it and revulcanize properly.

The Court: No, but if it is not vulcanized properly you cannot—

The Witness: We cannot make an impression from it.

Q. Or your impression is— A. Is poor.

Q. —is not exact? A. That is correct.

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Q. Mr. Shaw, at the recess I was about to ask you about the wax used to make the pattern and about the casting of that wax. Is there any critical point in temperature of the wax used to cast? A. Yes, it can be too hot or too cold.

Q. Now I hand you the patent again and ask you if you find anything with reference to that.

The Court: Well, suppose instead of asking the witness about that we just agree. Is there anything in the patent which has relation to the critical temperature of the wax?

Mr. Cooper: I don't think so. It says heat the wax. 195

The Court: All right. That is the only question.

Q. Now you also spoke of agitating your investment and you stated, I believe, that that was necessary in order to eliminate air bubbles. A. I beg to differ. I said it was of great assistance, as I recall. I didn't say it was necessary. I mean I don't know what you are trying to prove—I don't want to become irritated—

Q. If there are air bubbles in your investment which are not removed by agitation, what happens? A. Well, that

would, of course, entirely depend on where the air bubbles were.

Q. Well, let us assume they are at the casting surface, Mr. Shaw. A. Well, you would have a bubble. You would have an air pocket which in a proper sequence of events would fill with metal.

Q. And that would tend to make an imperfect casting, would it not? A. Yes, I suppose in a way. It is easily removed, there is not—

Q. I didn't ask you anything about its removal. I just asked you if it were there it would tend to make an imperfect casting. A. Imperfect to a degree, yes.

Mr. Groner: It may be understood also, Mr. Cooper, I assume, that there is nothing in this patent about agitating the investment.

Mr. Cooper: I am not sure.

The Court: Well, read it over and find out.

Mr. Cooper: Where it says, "The wax may be dipped in a solution of plaster of Paris."

Mr. Groner: It still isn't talking about the investment.

Mr. Cooper: I was just about to call attention to that. "And it may then have an investment material such as plaster of Paris poured thereabout or it may be invested directly in a more or less fluid mass."

The Court: Is there anything there about agitation?

Mr. Cooper: I should think pouring.

The Court: Pouring is not agitation. All right. Go ahead.

Mr. Groner: That is all, your Honor.

EDMUND DETLER, called and sworn on behalf of the defendant, testified as follows:

Direct Examination by Mr. Cooper:

Q. Where do you live, Mr. Detler? A. The present?

Q. Yes. A. In Queens, Long Island. 104-03 196th Street, Hollis.

Q. Hollis, Long Island. You were, I believe, born and brought up in Germany? A. That's right.

Q. And you are now an American citizen? A. That's right. 200

Q. What is your present occupation? A. Factory superintendent.

Q. For what concern? A. J. R. Wood & Sons, 216 East 45th Street, one of the largest and oldest in the country.

Q. Largest and oldest manufacturers of what? A. Of jewelry, special rings.

Q. Especially rings. Are you by trade a jeweler? A. Yes, I am.

Q. Where did you learn that trade? A. Well, I learned the trade with four years' apprenticeship in Germany and went about six years to art school. 201

Q. In Germany? A. That is right, correct.

Q. And how long did you practice the jewelry trade in Germany? A. Well, I should say since 1909 I always worked in jewelry. Even in my capacity today I am still showing the men what to do.

Q. Did you make rings, for example? A. That's right.

Q. And how did you make them in Germany? A. Well, I know the whole procedure in the jewelry from the designing from the jewelry, from the setting, engraving, polishing, even to the refining and the casting, too.

Q. Well, tell me how you made rings in Germany. A. Well, we first used to make a design and from the design they made a pattern and this time they mostly made dies.

Q. In Germany? A. It all depends what type of jewelry. There is a certain type made in die and other ones at this time handmade.

The Court: So your experience in Germany was confined to jewelry made with dies and handmade?

The Witness: That is correct.

Q. And the dies, are they expensive? A. Very expensive, yes. It only pays to make the die in design if you sell enough.

Q. That would be several hundred, something of that sort?

The Court: In quantities?

A. In quantities, that's right.

Q. And what would be the expense of making a die? A. Well, I made die in this country of course as much as $1,500 die.

Q. And, of course, less than that also? A. I didn't get that.

Q. I say less than that also? A. Less, yes, definitely. You can make them for $250. It depends on the design.

Q. Whereabouts in Germany was your business located? A. Well, it was the second largest jewelry trade in Germany Schwarzenberg, near Pforzheim. Pforzheim was the largest one in Germany.

Q. Now, you came to this country you said in 1926. With whom did you associate yourself in this country when you first came? A. Well, I worked for the firm Harry Kahn. It was handmade jewelry shop. I used to do the designing and the jewelry work there.

Q. And for how long did you stay with Kahn? A. From 1926 to 1934.

Q. And in 1934 what connection did you make? A. With the present concern.

Q. J. R. Wood & Company? A. That's right.

Q. And did you make rings with J. R. Wood & Company? A. Well, to the time when I came there, the most used to be—they have three different type of rings, first the biggest bulk of our rings is wedding rings all made with die; the second biggest bulk was class rings that used to be cast in sand castings.

Q. By class rings you mean graduating classes of schools and colleges? A. Exactly. And the rest used to be made by die and we only had a very few jeweler who did the handwork or made the samples, patterns.

Q. You didn't do any cuttlefish work? A. Well, I know this—

The Court: Did you do any of it there?

The Witness: Yes. In the once in a while, maybe once in a year as we say in the jewelry industry to make a dummy. You make a rough shape of a certain pattern.

Q. That you did by the cuttlefish? A. That's right.

Q. And that I understand is tracing a model into a cuttlefish bone? A. That is exactly.

Q. And by that you say you only get a rough approximation? A. That is exactly.

Q. And what did you have to do to the rough approximation in order to make a finished ring? A. Well, you had to do a lot of cleaning up. I take the bone and clean and form them to the shape I want them. There is two kinds of cuttlefish: there is the kind where you can get pretty close to the design. I never try to do this I only want rough shape, rough form as we call them dummy.

The Court: What did you use the dummy for?

The Witness: To make a pattern. This dummy can be used for design different patterns.

Q. And from the pattern what do you do to finish the ring? What were the next steps with the cuttlefish? A. Well, it all depends. When the ring was designed for making a die, we gave it to the steel engraver. When it

208 *Defendant's Witness, Edmund Detler, Direct*

was made for the casting department, the caster used to get them.

Q. Well what class of artisans did you have to finish up the rings made from the cuttlefish, for example? A. Well, to this day you need the best type of jeweler, as we call them today, model maker.

Q. Model maker? A. The best you can get.

Q. They are high-priced? A. High-priced. They are high-skilled.

Q. Now, did there come a time when you adopted the Jungersen process? A. Well, I think it was about in
209 1937 when Mr. Jungersen came to our plant and showed us some platinum and gold cast ring and wants to try to sell us the license for this patent and, frankly speaking, I was amazed over the result in his platinum casting.

Q. Did he demonstrate to you at that time or did he simply show you a casting? A. In the beginning he only showed us the result of the casting.

Q. Well, did J. R. Wood and Company take an interest? A. Right away, yes.

Q. Did they follow up and get a license? A. Right away.

210

Q. And from 1937 on you have been licensed by Jungersen— A. That is correct.

Q. —under his patent? A. That is correct.

Q. Now, what class of labor did you employ to operate the Jungersen method? A. Well, relative cheap type of labor. I should say you need one good man for making the mould and then a couple of girls to make the waxes and do the investing.

Q. And that is all? A. That's right.

Q. And that is a cheap class of labor compared to the other? A. Definitely.

Q. Well, after J. R. Wood and Sons adopted the Jungersen practice, what happened to others in the trade? A. To others in the trade? I didn't get this correct.

Q. I mean, after J. R. Wood and Company adopted the Jungersen practice, did others adopt it also? A. I assume so.

Q. Well, do you know generally the conditions in the trade at the present time? A. Well, I should say then a lot of people did it. I don't know if they used the license or not.

Q. But they did do it some way? A. That is right, exactly. 212

Q. What percentage, according to your estimate, of all rings are cast according to the Jungersen method? A. Well, I should say to my belief, when you talk about ring, at least seventy-five, eighty-five, maybe up to ninety per cent cast today, because there is a very few firm who sell enough ring who can afford to make die.

Q. What became of your sand casting process? A. Throw it out right away.

Q. You dropped it right away? A. That's right.

Q. And the cuttlefish? A. Well, that has come—

The Court: That wasn't much used?

The Witness: No. It can't be compared; see, 213

Q. Can you give an idea of the annual output of J. R. Wood and Company in these rings? A. Well, I tried to get some figure yesterday. I know we paid about $2,000 a year for the license and we paid five cents for a ring. That would be about forty thousand units.

The Court: Forty thousand rings?

The Witness: Yes.

Q. Per year? A. Yes, from this license.

Q. About forty thousand rings per year? A. That's right.

214 *Defendant's Witness, Edmund Detler, Direct*

Q. Now, how long does it take to make a ring from a pattern according to the Jungersen process? A. You mean when you have the pattern to make the mould?

Q. Yes, from the time that you have gotten up your pattern or model? A. Yes.

Q. How long does it take to make a ring according to the Jungersen process? A. Well, let me say this. It takes about two hours to three hours to make a mould. It takes just a few minutes to make a wax, but the wax have to be invested, and it should dry natural investment. So it all depends how long you keep this out before you
215 put it in the furnace.

The Court: Approximately how long does it take after you have the mould to make a ring? Just an approximation.

The Witness: Let's say, you would say from the time I got the pattern till I got out the first ring?

The Court: Yes.

The Witness: Well, I assume the next day.

The Court: Then after you have made the first ring—

The Witness: Oh, then it is no time.

The Court: Then they just—

The Witness: That's right. I had some girls that pro-
216 duced as many as 150, and some girls 300 waxes a day. Depends on the pattern, on the mould, how easy it is.

Q. Do you know of any other process in jewelry in which the wax is lost, that is, the wax mould is melted out of the permanent model? A. Not in jewelry.

Q. That's the only one? A. That's right, that's correct.

Mr. Cooper: That is known generally, if your Honor please, as the lost wax process, because the wax is melted out.

Q. Did you know of sculpture casting in Europe? A. Yes, I know this.

Defendant's Witness, Edmund Detler, Cross 217

Q. Did that suggest to you any way of making rings? A. Never.

Q. With all your knowledge of sand casting and die making and cuttle fish casting, did that suggest the Jungersen process to your mind? A. I say no. I was amazed when I saw it the first time.

Q. How does your practice now compare with your practice when Jungersen first taught it to you? A. Exactly the same.

Mr. Cooper: You may cross examine.

218

Cross Examination by Mr. Groner:

Q. Mr. Detler, you spoke of the process employed by Wood: A. That's it, exactly.

Q. Will you tell me what you do with a casting after you have removed the investment? A. Well, we have a certain pickle where we pickle them in.

Q. Is that all? A. Well, then you cut off the sprue and you clean them up, finish them up.

Q. And what does that cleaning mean? A. What?

Q. What do you mean when you say "We clean them up"? A. You mean first? We pickle them first, then we cut off the sprue and we file them and start on the top, 219
whatever it requires, the job.

Q. You spoke also of knowing about sculptor casting in Europe? A. That's it, exactly.

Q. What did you know about sculptor casting in Europe? A. Well, both ways.

Q. What do you mean? A. The wax way and the flush metal method.

Q. Well, I am afraid you will have to describe them to me because I don't understand it. A. Well, the flush method is the same procedure as the wax. You have the foreman braze the pattern and you take a high content lead metal with a low fusing melting point and you pour

220 *Defendant's Witness, Thoger Gronberg Jungersen, Direct*

it in and just hold it for one or two minutes—it all depends on what kind of metal—and you spill it out again; then you have your shell in there, a reproduction of your pattern. And that's the same way they used to do it in wax.

Q. I see. That's all you know about it? A. That's right.

Mr. Groner: That's all.

* * * * * * *

221

THOGER GRONBERG JUNGERSEN, the defendant herein, called and sworn on his own behalf, testified as follows:

Direct Examination by Mr. Cooper:

Q. Where do you live, Mr. Jungersen? A. 11 Pittsford Way, Summit, New Jersey.

Q. And you are the owner of the patent that is involved here? A. Yes.

Q. And the patentee of it? A. Yes.

222 Q. You were a Dane by birth? A. Born in Oslo, Denmark.

Q. And you came to this country when? A. I have been in this country many times for a short period, until 1927; then I came over here on a visitor's passport and with the intention to go back again, but then I changed my mind and I wanted to stay here and then I made application for citizenship * * *

The Court: And you have been here steadily since 1927?

The Witness: Yes, I have had my home here and in Canada.

Q. And you are an American citizen? A. Yes, I am.

Q. Now, you were about to say something about a temporary residence in Canada? * * * While you were there did you invent the process of the patent in suit? A. Yes, sir, I did.

Q. Up to that time what had been your busines ? A. Manufacturing different things in Denmark, and I have been a consulting engineer and an automobile dealer at the same time.

Q. And what kind of things did you create there? A. Well, I believe I made the first, or was instrumental in making the first Diesel engine that was ever flown in an airplane. 224

The Court: The first Diesel engine?

The Witness: Yes.

A. (Continuing) I made reflectors, those we have on the highways today, and on all these warning signs, and made several other inventions.

Q. Pumps for fire engines? A. Pumps for fire engines. I made pumps that are used especially in India and up in Canada. They are used in outlying districts. You put them underneath any car that comes along and it will pump water from a pond to put out fires.

Q. Well, you were in Canada in what years?. A. As far as I recall I moved to Canada for citizenship application, or rather the application to enter the United States 225 it was in 1929 or '30.

Q. And you stayed in Canada how long? A. I rented a home up there and my wife and my son stayed there and my son, who went to school in Canada, and I moved down here to the United States and lived in a hotel, except on Saturday and Sunday when I went back to see them.

Q. Well, did there come a time when your wife and son went back to Denmark? A. Yes.

Q. Yes. A. In 1933.

226 *Defendant's Witness, Thoger Gronberg Jungersen, Direct*

Q. In 1933? A. They went over to Denmark and came back here in the spring of 1934.

Q. Well, now, there came a time when you made this invention. A. At that time I lived up in Canada myself.

Q. Yes. At the time you made this invention? A. Yes.

Q. Well, state the circumstances under which you came to make it. You had not been connected with the jewelry business in any way up to that time? A. Not more than I married a daughter of a jeweler. That's the most I
227 knew about the jewelry business.

Q. But I assume you didn't know anything from that. A. No.

Q. Well, state the circumstances under which you made the invention. A. Well, that was here in the depression. I lived with a Mr. Corrigan.

* * * * * * *

A. (Continuing) I lived with a gentleman, Mr. Corrigan, in Toronto. He used to be the sales manager for one of the licensees in the States that had a license under a hydraulic hoist and dump process that they have some patents on, and he was out of a job, and then we come
228 to discuss about how hard it were to get jobs, and I insisted that anybody that wanted a job that wanted to work, he can get a job. * * * Then I said, "I will take and get any job that you would suggest to me," and we took a newspaper, and he read in there about a jeweler that advertised for a caster, and then he jokingly asked me, "How will you do as a jeweler?" I said, "I will do fine." And then I went to this jeweler and asked him if I could have the job. When he heard that I was not a jeweler, then he wouldn't listen to me. I said, "What do you care, if I am a shoemaker or a jeweler, if I can do the job that you want?" And, well, finally, after a lot of arguments, I paid him ten dollars as a deposit for one of his most intricate patterns that he had.

Q. Patterns? A. Yes. It was a piece of hanger for—I guess they call them pendants.

Q. Yes. A. Well, I got that pattern and then I started to study it at first from what I know about sand casting and I found—I discarded that again, because I thought that would not give a very good impression for it; and then I thought about using the method similar to what the dentists were using, and that means making a wax pattern and then melting the wax pattern out. Now, first—then there was a question to make a mould for this piece of jewelry, and that was quite a thought first in my mind, how to make this mould; I went through the 230
thought of using plaster-of-Paris, but with the plaster-of-Paris it wouldn't work because you will absorb the wax into the porous plaster; and then I come to think about rubber, and I went into a service station on my way home and bought some patching rubber that is used for repairing automobile tubes. Then without any tools, much more than a pocket knife, I took a piece of board, as far as I recall it was a piece of 3-ply wooden board about a quarter of an inch thick, and I cut a hole in that board and took another piece of wood and put it as a backer to it, and then I took this piece of jewelry and I cut slices of the thin rubber—it was approximately a 231
sixteenth of an inch thick—cut that in a small piece and built them up around the piece of jewelry I had; and then I squeezed it between the two slabs of wood and inside the frame that I had made out of wood, and then I squeezed it with a little clamp and put it into a baking oven, regular in the kitchen, and I baked the mould for a long time until it was cured. I took it out several times, I remember, to punch in and see if it was cured, but as far as I recollect now it took an hour or two before the heat had penetrated into the center and cured the rubber. Well, after I had the rubber mould of this piece of jewelry, then the problem was to fill it. I poured

some wax into the opening. That was an open mould, if I could express it that way; just like a flat piece of rubber with a design of the pendant on the one side. That was on one side. Then I poured the wax in there and most just stuck to the mould. I didn't get far with it.

Then I tried to squeeze it down with my fingers and with a backing first of plaster of Paris, later of a piece of type metal, and that didn't work. I got fins all over it and I couldn't get the patterns out.

233 Then I came to think about, well, if I pour the wax in from one end, if I could fill it that way, and I tried, and the wax did not fill the piece all the way down. Some place it filled fairly good, and some place it did not fill at all. Some place there was a very poor impression, like there were on those pictures on that exhibit.

Then I discarded that. I took a cloth hanger from approximately an eighth of an inch thick steel.

Q. A coat hanger? A. Yes, one of these regular coat hangers.

Q. Yes, all right. A coat hanger. A. A coat hanger, and I made a little swing out of it and I took it so I could swing it with centrifugal force, and then I took an 234 old tin can and made myself a little crucible out of this tin can and pointed the nozzle of the crucible into my mould. Then I melted some wax and poured it into my little crucible and swung it around, and that filled the mould with the finest interior that you could ever wish. Then it was just a question of some of it may be a little too hot and some of it may be a little too cold, and after you try it two or three times, then you get them perfect.

Then I took this model. Now I done the most important thing. That was to reproduce a model of this article I want to cast. Then I didn't have any centrifugal casting machine as I knew that the dentists were using.

and then I looked in the telephone book. I found what they call—

Q. Dental supply? A. Mechanical dental house. This dental technician is doing castings for the different dentists, and I called him up first on the 'phone and asked if I could come up and talk to him about lending me that dental machine. He said yes, I could come. I went in to this gentleman and I explained him what I want to do, and he seemed very much interested as he had been a jeweler himself, and had branched into this dental casting. He had branched into the dental trade; and then I made my first castings in his office, in his 236
laboratory. I then took this casting down to this jeweler. By the way, his name was Fremes.

Q. Fremes? A. Yes. And then he said, "My God, that's the finest casting" he had ever seen. Well, I could start right away.

Q. To work for him? A. Yes, to work for him. Then I said, "Well, I'll tell you. This whole thing here is really just to prove that the job can be had if you really want the job, and since you say that is such a good casting, then I would like to develop it further and make it a well workable process, get the patents out on it, and you can buy the patents for Canada," and agreed—I be- 237
lieve that was at the same first meeting—that I should have $2,000 for the patent when they issue it in Canada, and under this condition he said I could start right away in his shop.

Then we went to another building where he had a big open loft, and we made some partitions in this loft for a little shop and built the benches there, and so on, and produced. Right before Christmas in 1933, we started production in this little shop.

The Court: Well, had you then developed the machine?

The Witness: Well, I had developed that before. No, not the machine that was used for casting, because that

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is commonly used in the dental trade. That is a little centrifugal machine for casting dental inlays and so forth.

The Court: You developed—

The Witness: The technique.

The Court: The technique of the mould?

The Witness: Yes. I developed that all and made up some metal framings instead of my wooden frame, and in fact we were starting production there before Christmas and between Christmas and New Year in 1933.

Q. Now, can you fix the date when you first heard of
239 Fremes? By an advertisement in the Toronto paper? A. Well, I first heard about Fremes through Mr. Corrigan, who had his ad, I believe it was the Toronto Star, although I am not sure.

Q. Well, I have here what purports to be a copy taken from the Evening Telegram, Toronto, December 4, 1933. A. That is quite possible.

* * * * * * *

Mr. Cooper: This, if your Honor please, purports to be * * * a copy certified by the publisher of the newspaper. * * * That contains an advertisement in these words: "Wanted: An experienced
240 sand caster for jewelry work. S. Fremes and Company, Ltd., 333 Adelaide Avenue West," and it purports to be of the Evening Telegram, Toronto, Monday, December 4, 1933.

Q. I show you that document and ask you if that is the way you fix the initiation of your work which you have described as leading up to your job with Mr. Fremes. A. Yes.

* * * * * * *

Mr. Cooper: I will offer in evidence the advertisement certified.

(Received and marked Exhibit D-7.)

Q. Now, you said that your wife and son had gone back to Denmark by this time? A. That's correct.

Q. Did you communicate with them when you got the job with Fremes? A. I communicated with them I believe when we started doing the work there. I am not sure that was at the date when I got the job, but I sent them a telegram right before Christmas where I explained that I had started to work with jewelry.

Q. This is the original of the cablegram to your wife and son? A. Yes. It is dated Dec. 23, 1933, and reads, 242
"Got job wholesale jeweller today greetings to all dash Thoger."

Q. Now, following the creation of this process, you filed applications on it in various countries? A. Yes, I did.

Q. In Canada first, or, I mean, in Canada? A. First in Canada and the next day I believe we were in the United States.

Q. And you also filed an application in Great Britain? A. I guess I filed it in about around twenty different countries.

Q. And patents were granted in all these countries? 243
A. Yes. There are a few of them that are not granted yet because of the war.

Q. All right. Well now, in connection with the— A. I believe that is only two.

Q. Yes. In connection with the British application, there was some opposition, as I understand, to the grant of the patent at first? A. Yes.

Mr. Cooper: Well, I will have the opinion of Judge Luxmoore marked for identification.

The Court: Mark it for identification.

(Marked Exhibit D-9 for identification.)

Q. Well, now, after you had filed your application in Canada, you got in contact with a concern known as Goldsmith Brothers, according to one of the witnesses here? A. I did.

Q. What did Goldsmith Brothers do with respect to your application? A. Goldsmith Brothers are smelters and refiners, and I went to them because when finally Mr. Fremes should buy the patent, he had been to an attorney, and he advised me that they did not need to buy the patent because it had been made in his shop. He forgot, Mr. Fremes forgot to explain to his attorney why I was hired, and that was because I had developed this here to such an extent that he was interested.

Q. Because you developed it on your own? A. Yes, and I explained that to Mr. Fremes, but he did not believe me, and then I said, "Well, Mr. Fremes, I have agreed to a price and I will sell it for that price. If you don't want it, then you only be doing me a favor. I believe I can get much more for it from other places," and I went out and the first person I saw were Goldsmith Brothers, or Mr. Nusbaum of Goldsmith Brothers, and he bought it right away I believe it was $5,000.

Q. He bought your Canadian patent from you? A. Canadian, right, for $5,000.

Q. And he thereafter had the exclusive ownership of that, did he? A. He had the exclusive ownership of that in Canada, yes.

Q. And you didn't get anything out of it except the $5,000? A. No. I got the $5,000, and I helped him later on with sales and got a little out of that.

Q. You helped him with his licenses to other people in Canada? A. Yes.

Q. Well, now, you took out a United States patent, and by that time I suppose you had come to live in the

United States, had you? A. I have been in New York most of my time and I had my family living up in Canada. I believe that was 1938 or so.

Q. It was in 1938? A. Or so.

Q. May 24, 1938, your patent was issued. A. Yes. Well, on that same time I bought a home in Summit, New Jersey, and my family moved down there.

Q. Well, did you negotiate licenses under your patent or application before the patent issued? A. Yes. Many.

Q. In the United States? A. Yes. Most of my licenses my licenses I believe were issued prior to the patent were issued.

Q. Most of the licenses that you obtained were issued before the patent issued? A. I believe so. I am not sure about the figures.

Q. At any rate there were some thirty-eight or forty licenses, something of that sort? A. Yes. I guess that is something like that, in the United States.

Q. Can you name any of the licensees? A. Well, we have—

Q. Krementz? A. Yes, Krementz here in Newark, and Larder here in Newark—there is a list somewhere, I believe, here.

The Court: Well, you had thirty-eight approximately.

The Witness: J. R. Wood, which is mentioned here.

The Court: All right.

The Witness: All the better houses we had.

The Court: All large manufacturers?

The Witness: No, I wouldn't say that, but anybody. There is only left some few chiselers.

The Court: No. I mean the manufacturers doing a large volume of business?

The Witness: Yes, most of those we have. Also small. We have as little as one man. In Philadelphia one person has a license.

Q. That is where he had no employees at all? A. He had no employees when he started. I believe he had his daughter; yes, he had his daughter helping him.

Q. Yes. A. But now he has a few.

Q. I do want to ask you about your foreign licenses. Take Canada, for example; Goldsmith has issued a number in Canada? A. I understand that Mr. Goldsmith used a better technique than I did—

Mr. Groner: May it please your Honor—

The Court: Wait a minute.

Mr. Groner: It seems to me that what the situation in Canada is under a patent which may differ from the patent in suit is utterly irrelevant, and I also call your Honor's attention to the fact that the witness quite patently doesn't know the facts.

The Court: Yes.

Mr. Groner: As any answer.

Q. Well, how about in other foreign countries? A. Well, wherever they have been presented, they have been very readily received.

Q. Well, tell me about your dealings with your patents in other countries than Canada. A. I have them operating now in England, Canada, in Sweden, Norway, and I believe in Finland, at least I sold a license there, and in Germany and in France and in Belgium, Australia, India, and down in the South American countries; I believe in Brazil and Argentine, that have started in now.

Q. Yes. You have issued licenses in all these countries that you have mentioned? A. Yes.

Mr. Cooper: Now, if your Honor please, Mr. Jungersen is prepared to demonstrate to your

Honor how this process is practiced, if you would like to see it.

The Court: I think it might be helpful.

Q. Now, will you demonstrate your process, using this apparatus that is here in court? A. Yes.

Q. And describing as you go along just what you do. A. I want to take a rubber mould that is made around a pattern. This rubber mould may be made in one piece or it may be made in many pieces. The main idea is that we have a true copy of the pattern inside that rubber mould. The lines that show on this here are just a duplicate of what you otherwise would do with a carving into the surface or building up. That's for locking the two mould sections together: and that can be done— 254

The Court: Now, where is the true moulding part which affects the ring?

The Witness: The true moulding part is this in here. That is a core; this piece here.

The Court: I see.

The Witness: That's a core that goes inside the ring. I will show you the casting from that piece. Here is the casting.

The Court: All right. Now, you have the upper and lower rubber moulds. 255

The Witness: That is correct.

The Court: Which fit in together and are held together by the little knobs and the indentations.

The Witness: The interlocking parts.

The Court: And at the center of that you have the—

The Witness: The core.

The Court: —the core: and that core is for the—

The Witness: The center inside of the ring, the inside here (indicating).

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The Court: All right. Now, that's the effective part of this apparatus which moulds the—

The Witness: Wax pattern. It is a replica of the model.

The Court: All right. Now, show us how you work it. After you get the two rubber sections—

The Witness: You put the two rubber sections, first, give it a little lubricating oil—

The Court: Yes.

The Witness: —to prevent the wax to stick too much to the surface, and that lubricating oil is generally done
57 with a little paint brush, you can warp it in like this here, or you can dip it in and blow it off, in any known manner. Then I put it into the centrifugal casting machine and lay this in here, with the gate hole up towards the crucible; then I just take a little spoonful of wax and pour it in like this here and let her swing.

The Court: Now, that throws the wax into the mould.

The Witness: That throws the wax into the mould, and the air will escape out through the same entrance where the wax entered in.

Q. It is necessary to have an escape of air so that the model will be an exact duplicate? A. The escape
58 is through my gates.

Q. Yes, but I say it is necessary to have an escape of air— A. Yes.

The Court: Through the same aperture through which the wax entered?

The Witness: That is true.

The Court: As the wax goes in the air is forced out.

The Witness: I will make another one (demonstrating). Then you open up the mould and we have the pattern; then you take the pattern out.

The Court: That is the pattern in wax which is removable.

The Witness: Which is removed, which is identical copy of the metal pattern.

The Court: All right. Now, what happens?

The Witness: Well, then we take this pattern here and that is set on the sprue base. That part of it is not—

The Court: That is not part of your patent?

The Witness: No, we use this pattern here to invest and make casting mould.

The Court: Now wait a minute. That's all that is necessary for the demonstration of this.

260 The Witness: I have another pattern here (shown to the Court). I have here, your Honor, a flask (handed to the Court) and it is used where the wax pattern has been invested and is cut—

The Court: And what is the material of investment?

The Witness: A finely ground silica sand and plaster of Paris mixture. That is dental investment.

By Mr. Cooper:

Q. Then what happens when you have invested? A. Well, after you have invested and set them then they are put into an oven and the wax would be melted out leaving a cavity that is true to the wax pattern that 261 was inside.

Q. A true negative of the wax pattern and the final metal is cast into that cavity.

The Court: Suppose you mark this for identification.

A. Can be cast the same way or with many known methods.

(Marked Exhibit D-10 for identification.)

The Court: But the crucial part of your process is the inserting of the rubber mould and the injection of the wax by centrifugal action?

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The Witness: That is all those small steps put together.

The Court: But I mean the steps beyond that, beyond the formation of the wax model are not part of your invention?

The Witness: Yes, I believe it is. It is the process until you get the metal.

The Court: Until you get the metal?

The Witness: Yes, as far as I understand.

The Court: Will you just take the stand again now?

263 (Witness resumes the stand.)

By Mr. Cooper:

Q. What you have just been saying, in answer to the Court's question is that your invention is an entire series of steps? A. Yes.

Q. As you have outlined them from beginning to end? A. Yes.

The Court: Including the placing of this wax model on the sprue and the investment?

The Witness: Well, that can be put in any manner, you can put it in and hold it there until the wax is set. That is just an easy way to do it or a practical way.

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Q. But it is a part of your invention to put the wax into the investment material? A. That is correct.

Q. And afterwards to cast into the investment material after the wax has been melted out? A. Yes.

Q. Now, did there come a time when you disclosed this process to Ostby and Barton? A. Yes, there was.

Q. When was that? Was that before that patent issued? A. This was the second jewelry house I contracted in this country.

Q. But was it before your patent issued? A. Long before my patent issued.

The Court: But after the patent was applied for?

The Witness: Yes. That was as far as I recollect around October or November of 1934.

Q. Whom did you meet on that occasion? A. I met Mr. Ostby and I met one of two other gentlemen down there. I do not recall their names right here.

Q. You went up to their place in Providence, Rhode Island, did you? A. Well, I had first met a gentleman from Cohen and Rosenberger, making custom jewelry, and I met them up—this gentleman up in Canada. He had heard about that there was such a new method up in Canada, and he came up there and wanted to have a license from me, and I issued them a license, and then when I was down here to instruct them, then they said: "Well, we have a lot of other jewelers here in Providence."

Q. Oh, this concern that you mentioned was in Providence? A. Yes.

Q. Yes. A. And it was a Mr. Royal Marcia, Mr. Royal Marcia. He said he knew one of the best concerns in the whole country.

Q. So he introduced you to Ostby and Barton? A. He introduced me to Ostby and Barton, yes.

Q. And you went there and you saw Mr. Ostby? A. I believe as far as I recall he called on the 'phone and called Mr. Ostby and said that he was going to—

Q. That is, your friend, your other licensee in Providence? A. Yes, and he said he was going to send me down there. He thought I have something that was very interesting for them.

Q. And you went in to see Mr. Ostby and Barton? A. I went down to see Mr. Ostby. I called for him.

Q. What did you show them, if anything? A. First I showed them what those two trays I have here with

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samples, and many of the samples are the identical samples.

Q. You mean these?

The Court: These mountings?

The Witness: Yes, these mountings.

Q. These two trays of samples you showed them? A. Yes. I can pick out—this here, this one was there, I am not sure about that one. This one. That one. And I have some more down here.

269 The Court: Well, you showed them a tray containing samples of mountings among which were these eight which you now show?

The Court: At least these eight were on the trays that you showed them as samples?

The Witness: There were more than this here, but I cannot be sure.

The Court: Mark them for identification.

Mr. Cooper: They can be all marked as one number.

(Marked Exhibit D-11 for identification.)

The Witness: I have some more, but they were definitely in the things prior to when I left there.

Q. There were others besides these eight? A. Yes.

Q. And you showed them to all these three men in Osthy & Barton? A. Well, Mr. Osthy was the first one I called on and he called in somebody else to see it.

Q. Well, did you make any statement to them before showing them these samples as to whether they would be free to use the process or not? A. I told them that was a process that I had made application for but I had no patent on it yet, so I could only sell them, as I expressed it at that time, a cat in a bag. I said, "I can

show you here what I can produce, and if you are interested in that, then I will show you the whole process—if you are interested in reproducing to the same degree of accuracy." And then Ostby & Barton were very much interested, but they told me that their business was gent's rings.

Q. Was what? A. Gentlemen's rings.

Q. Gentlemen's rings. A. And I did not show them more than one or two of gentlemen's rings, heavier rings. Then I promised to come back again with some of those the next time I came down there, because I came down quite often, especially in the start, to get them going right.

Q. Well, the point of my question was whether Ostby & Barton made any statement to you or you made any statement to them as to whether they would be free to use the process. A. I certainly did make a statement to them, that they were not free to use it, but I told them I would give them a license if they wanted to.

The Court: Well, had you shown them the process then?

The Witness: I had shown them first the method, and that was interesting to them—

The Court: The method?

The Witness: Yes. No, pardon me, I am not correct there. I showed them the castings first.

The Court: Yes.

The Witness: They were interested in it, but they were not interested at that time to the extent that they wanted a license. They were only making these heavier rings and not making this particular type. Then the next time I came down I took my moulds with me for making the other type of rings—I only had the rubber moulds with me the first time; I don't recall if I showed them the rubber moulds the first time; but the second time I do recall was the first time I showed them any—

thing. Then I told them, "Well, gentlemen, I ask your word of honor that this method I am going to show you is not going to be told to anyone, because I haven't got any patent on it yet, I have only an application, and I don't show it to anybody otherwise, but I believe that I can trust you," and after I had done that—

Q. Well, did they make any reply to that? A. They said yes, and I took up my moulds and my frames and showed them the whole thing.

Q. And this second visit was also in 1934? A. That was in 1935.

275 Q. 1935? A. Yes.

Q. Well— A. I have always considered Ostby & Barton as gentlemen.

Q. Well, never mind that. But I want to ask you this: Did you show them or describe to them the entire process? A. I did not show how we spin them on the centrifugal machine, but I explained it as well as anybody could, explained how it was done. I showed them the model, the mould, and how it was laid in the plaster-of-Paris, because I had the whole thing mounted on the plaster-of-Paris, and the half mould, and I showed them the finished mould that had been formed

276 around the plaster-of-Paris. In other words, the steps necessary for anyone with any common sense to do it.

Q. Yes. Was anything said at the time you were there about what their then process that they were using for making rings was? A. Yes. The reason I showed them this here at all, that's because I said, "You are a large house and there will be some day when you will want to use this here."

Q. Well, did they make any statement to you about what they were then using? A. Yes, stamping.

Q. They said they were stamping? A. Yes.

Q. And was that on the occasion of your first visit or second visit? A. That was both on my first and second

and third and every time they have been most courteous to me when I came in there. I guess everybody is a little too broad a word but the leaders of the firm were together to discuss what I have and see what I have and then finally I was told that they were infringing.

Q. Never mind that. But they stated to you that they were making them by stamp on the occasions of your visits there? A. Yes.

Q. Did they say they were not going to use that process? A. At the first time they said—naturally they would not divulge it to anybody but I cannot remember the words, but it was to that effect and that was the reason for our showing them in confidence and showing the method.

Q. And they never did take a license from you? A. No.

Q. You have, of course, visited the ring trade generally, the jewelry trade generally, haven't you A. Yes, sir.

Q. What have you found as to the amount of use there is in your process? A. Well, what I have found is one thing and that is those people we have been over, but what I have been told from other people, that is an entirely different thing.

Q. Never mind what you have been told. That wouldn't be admissible anyway. But tell us what you have found as to the extent of use. A. Well, if I look in a jewelry store today—well, I think 90 per cent. of what is there looks like it was produced with my method.

Q. Well, you know your licensees, of course, and how much they use? A. Yes.

Q. And you know a lot of infringers, I suppose? A. I don't know of any more than those we have on file where I have definite knowledge of.

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The Court: I think we might now mark the exhibits which have been used here. They are first of all this aparatus.

(Received and marked Exhibit D-12.)

The Court: That may be marked as one exhibit.

Mr. Cooper: The whole thing?

The Court: The whole thing. Is that on a stand, all one stand? * * * Next is the other mould. * * * These are just things used here to show me the way it was done. * * * The main thing is the—

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The Witness: Centrifugal machine and so on.

The Court: And one mould. And the next was—what do you call that?

The Witness: A flask.

The Court: And that is a cross section?

The Witness: Cross section of a cavity in the flask.

The Clerk: It has already been marked Exhibit D-10.

The Court: Flask with cross section of the cavity.

The Witness: Created by the wax mould.

282 The Clerk: That was marked D-10.

* * * * * * *

The Court: I much prefer to take this description just given me by the witness. Now, have you marked the samples that were in the trays?

The Clerk: No, I haven't, your Honor.

The Court: Mark those, please, too. You might mark these all in evidence.

The Clerk: Samples are marked D-13.

(Received and marked Exhibit D-13.)

Mr. Groner: What do you mean by that?

The Court: They are part of that big exhibit, because it is part of the demonstration.

* * * * * * *

Mr. Groner: Judge, is the mould that we have just put in, is that the rubber mould?

The Court: This is a rubber mould that will be part of D-12.

Cross Examination by Mr. Groner:

Q. Mr. Jungersen, if you are casting metal into a mould by pouring it and you find that you don't get a satisfactory casting, what do you do? A. Try it again. 284

Q. Well, how would you try it on this second time? A. All depending on what trouble there were with the first one.

Q. Well, let's assume that you do not get a full impression. A. If I didn't get a full impression due to too cool a metal, then I would try a little hotter metal the next time.

Q. Let's assume you have got the metal up to a proper heat. A. Yes.

Q. Would you not use some method of applying force? A. That is depending on what type of a mould you would be using. If you are speaking about a die casting, yes, I would force it in a little harder. 285

Q. And if you were using an investment? A. Well, on the centrifugal machine, then I may use a little harder pressure on it.

Q. Excuse me just a minute. My whole question is premised on the idea that you are pouring and not centrifugally casting your molten metal. A. Well, you are asking me whether, as a question, like somebody that did not understand what they were, what they wanted to know?

The Court: No. Wait a minute, now. Suppose you start pouring into a mould and you don't get a proper casting.

286 *Defendant's Witness, Thoger Gronberg Jungersen, Cross*

The Witness: Yes.

The Court: What do you do?

The Witness: I improved my wax too hot.

The Court: You are not going to use any centrifugal process at all, just pouring.

The Witness: Yes.

The Court: Well, then what would you do if you don't get a proper mould?

The Witness: Then I might heat my metal slightly more.

287 The Court: You may heat your metal slightly more?

The Witness: Yes.

The Court: Suppose you have your metal at a proper degree of molten condition of fluidity and then you don't get an accurate impression, what do you do?

The Witness: I may raise my gates slightly after I get a higher wax on it, or vent the moulds so that it will eliminate the air from the mould a little better if there was a dense mould.

Q. Well, now, if you did all that and still didn't get your impression, what would you do?

The Court: Well, wouldn't that depend on the
288 nature of the imperfection and impression?

Mr. Groner: I don't think so, may it please your Honor, and what I am getting at I am sure Mr. Jungersen has no objection to answering.

The Witness: No, I have no objection—

Q. You would apply force, wouldn't you, Mr. Jungersen? A. I have no objection to your answer, if you will please define that question to one type of a mould.

Q. Well, you can take— A. There is hundreds of different types of moulds and there is hundreds of different ways to overcome it.

Q. Take a die-casting die or an investment, either one or the other. A. Pardon me; let's take one at a time.

Q. All right. A. A die-casting die?

Q. Go ahead. A. And then?

The Court: Well, your metal is of the proper consistency?

The Witness: Yes.

The Court: And you pour it and you don't get a perfect model. What do you do then?

The Witness: Well, anybody knows that a die-casting die is not pouring. 290

Q. Well, we are pouring on these circumstances. A. Yes, but there isn't such a thing.

Q. Mr. Jungersen, isn't it a fact that a die-casting die is simply a metal mould? Isn't that true? A. Not when you say a die-casting die.

Q. Well, now, do you mean— A. If you said metal moulds.

Q. All right. A. You may be correct.

Q. And you could use on many circumstances a die-casting die without using the pressure machine that normally is associated with it, couldn't you? A. I doubt it.

Q. Well, what is the difference between a die-casting 291
die and a multi-part metal mould, Mr. Jungersen? A. A die-casting die is designed for taking a very high pressure.

Q. But it is simply a very strong multi-part metal mould, isn't it? A. Very strong, yes.

Q. But it is that, isn't it? A. It is a multi part mould, yes, sir.

Q. All right. Now, we have our multi-part metal mould or your die and you pour metal into and it doesn't make a good impression; you have the correct temperature and you have all the gates and risers and everything of that sort that you need. Now, you would correct that difficulty

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by applying force, would you not? A. I don't recall a single case where I have seen them pour into a mould of the type you describe there.

Q. I didn't ask you that. A. No. But then—

Q. You assumed to know something about the casting art. A. Yes. You don't.

Q. That has nothing to do with it. A. You wouldn't ask me that question if you did.

The Court: Don't let's get into any discussion like that. We are trying to find out a certain thing. Will
293 you let me see if I understand you?

The Witness: Yes, sir.

The Court: This multi-form, is that what you call it, multi-form?

Mr. Groner: Multi-part mould.

The Witness: Multi-part mould.

The Court: Multi-part mould—is a die when it is made of stronger material, is that so?

The Witness: That's correct, yes.

The Court: All right. Now, suppose you pour a metal of the proper consisteney into that.

294 The Witness: Yes, sir.

The Court: Do you ever have to use force in order to get a proper impression?

The Witness: It could be used to fill the mould, but I am at a loss to answer that particular question in that connection because that is what die-casting means. That is a mould were you put a great force back behind it to fill the mould.

The Court: All right. You put great force behind it to fil the moulds.

The Witness: Yes.

The Court: So that in that die-casting you use great force behind the metal to fill the moulds?

The Witness: That's right.

Mr. Groner: Good.

Mr. Cooper: I think that's what he said first.

Mr. Groner: I misunderstood him if he did, sir.

The Witness: That's a multi-part mould.

The Court: All right.

Q. Then if to fill your mould your molten metal flowing under the pressure of gravity alone doesn't fill the mould, you apply some form of force, isn't that correct? A. I do, yes.

Q. Now, is there any difference of any sort in the effect of force on wax and on molten metal? A. I said I do because I meant—I am referring to what I am doing in my patent. 296

The Court: No. The question now is, is there any difference in the effect of force applied to molten metal and force applied to wax, molten wax?

The Witness: Yes—

The Court: Does it have the same result?

The Witness: Not exactly, because the one is a sticky substance and the other one is not sticky or adhering to the surface.

Q. But both of them when in molten condition and when force is applied do flow into the intricate details of the mould cavity, do they not? A. You are correct. 297

Q. You referred on your direct examination to having granted a large number of licenses prior to the issue of your patent; that's correct, isn't it? A. Yes.

Q. At the time you granted these licenses did you furnish your licensees a demonstration of your method or a copy of your patent application? A. You are referring to the time before I had a patent—

The Court: Before you got the grant of the patent.

298 *Defendant's Witness, Thoger Gronberg Jungersen, Cross*

Q. That's exactly what I asked. A. I did not give anybody a copy of my patent application.

* * * * * * *

Q. Did you hear Mr. Detler testify this morning? A. Mr. Detler?

Q. Wasn't his name Detler?

Mr. Cunningham: That's right.

A. Yes, I did.

Q. Did you hear him testify with relation to the nego-
299 tiating of a license between you and J. R. Wood? A. I don't recall what he did say.

Q. You heard him testify? A. I heard him testify, but I don't hear as good as I should.

Q. Did you hear him testify that when you first came to Wood in 1937 you showed the finished article? A. That is correct.

Q. But that you did not disclose the process? A. That is correct.

Q. Which you kept as a secret? A. That is orrect.

Q. Did you also hear him testify that you didn't disclose the process until the license had been— A. Until the license was signed.

300 Q. And that was your usual practice? A. That was my usual practice with exception I have shown, as far as I recall; I showed Wood the moulds in which we cast the wax.

Q. Now, in these visits which you say you made to Ostby & Barton, isn't it the fact that you only showed the finished article? A. No, sir.

Q. What more did you show or tell them? A. Well, I took Ostby & Barton as they were presented to me or told to me, that they were gentlemen and I trusted —

The Court: No, what did you show them?

The Witness: I showed them the rubber moulds. Well,

let's start at the beginning. I showed them first the actual casting and then the model of the casting, how it was traced, the wax onto the plaster of Paris, and the rubber mould form around it and the little piece like the one that was exhibited here that closed—that means the flask with the wax investment in that flask and that is what I explained to them how it was done.

Q. Did you tell them anything about centrifugal casting? A. Yes, I did.

Q. Are you sure? A. Absolutely.

Q. Have you any evidence of it? A. I don't recall, but my son is in court. He will recall if it was mentioned centrifugal—no, he will recall that I told him, but I do know that it was cast by centrifugal force.

Q. Your son was with you? A. My son was with me the second time I came to Ostby & Barton.

Q. And that you say was in the latter part of 1934? A. '34, yes.

Q. How old is your son now? A. He is twenty-five. No, pardon me, that was the second time we were there was in '35.

Q. That is exactly what you just said. A. I get mixed up on the year, but that was in 1935.

Q. What part of 1935? A. I couldn't tell you.

Q. Was it early, middle or late? A. I believe it must have been in around February.

Q. Early part? A. Yes, in the early part.

Q. Ten years ago or ten and a half years ago? A. That is correct.

Q. Your son was with you on that occasion? A. Yes, he was.

Q. And you say that you then disclosed to them that you used in the practice of your methods centrifugal force? A. That is correct.

Q. Then you didn't write them anything? A. No.

304 *Defendant's Witness, Thoger Gronberg Jungersen, Jr.*
Direct.

Q. And you didn't have any commitments from them as to taking a license? A. I trusted them.

The Court: No, did you have any written commitments?

Q. I didn't ask you that question.

The Court: Did you have any written commitments?

The Witness: No, none whatever. On the contrary, they said they did not want a license at that time.

305 Q. That is all.

THOGER GRONBERG JUNGERSEN, JR., called and sworn on behalf of the defendant, testified as follows:

Direct Examination by Mr. Cooper:

Q. Mr. Jungersen, you are the son of Mr. Jungersen, who just testified? A. I am.

Q. And you are at the age of twenty-five, I believe he testified? A. Correct.

306 Q. Did you hear his testimony about visiting Ostby & Barton in 1935 on an occasion when you were present? A. Yes, sir.

Q. Did your father then and there describe

The Court: Suppose you tell us what you recall about that meeting and who was there.

The Witness: Well, my father and I came to Ostby & Barton Company and we saw Mr. Gregg at first and then we sat down at a conference table there and discussed the castings that we had along, the samples, and Mr. Gregg told him—Mr. Ostby and another gentleman, a de-

signer, were there and a fourth party—I don't recall what that other gentleman was in the firm—but we discussed the whole matter in general about the castings and the quality of them and so on; and then after we discussed the actual castings for a while my father said that he felt that they were gentlemen and he would like to, if they would give him their word of honor that they would not disclose to others or use it without first obtaining a license, that he would like to disclose just a little idea of how it was done. And they said they would 308
agree to that and then he took out some of the moulds—he had some rubber moulds along and metal moulds which showed the type of mould we used in our casting and also explaining how the mould was made and how it was used in the centrifugal casting merely by describing it, that it spun around the axis there and he gave a general outline of the process.

The Court: Well, at that time were you familiar with it yourself?

The Witness: Yes.

The Court: How did you acquire familiarity?

The Witness: Well, I had watched dad do it at home when he was working on it, and I had also been up to 309
his shop and watched it there.

Q. His shop was then at Nassau Street, New York? A. No. The place I had seen it was when he was working with it at Fremes Company, and also at Goldsmith Brothers in Toronto.

Q. Both in Canada? A. Yes.

The Court: How old were you then?

The Witness: What do you mean? A. When I first saw it?

The Court: When you first saw it at Fremes.

The Witness: Well, that was when I first came back

310 *Defendant's Witness, Thoger Gronberg Jungersen, Jr., Cross*

from Europe in 1934, in the early part of 1934, April, I believe it was, and I saw that work there, and I also made use of it myself in casting different things for toys. I was interested in making model airplanes and I cast some small parts for that by the same method because that was something that the boys around town liked to play with, and we used it for that.

Mr. Cooper: That is all.

311 *Cross Examination by Mr. Groner:*

Q. Mr. Jungersen, how do you fix the date in 1934? A. Which date?

Q. The date of this visit to Ostby and Barton. A. Well, the date that we were there was not 1934. It was 1935.

Q. How do you fix that? A. It was during my vacation from school.

Q. In February? A. No. I believe it was a little later. I think my father was a little in error on that, but it is hard to say when.

312 Q. Well, place it, will you? A. I would say it was during the summer vacation.

Q. Of 1935. How do you distinguish between the summer of 1935 and the summer of 1936 or 1937? A. Well, mainly by the period of time that has elapsed since. I have been doing other things in between in the different years.

Q. Do you recall what you did eight summers ago?

The Court: That would be 1937.

A. 1937, the summer of 1937, I believe I went on a trip up to California with my father.

Q. And 1939? A. 1939. We had moved down here in 1938, and I was generally just going visiting different jewelry firms with my father.

Q. And in the summer of 1935, were you living in Canada?

The Court: When did you come back from Denmark?

The Witness: In 1934, in April.

The Court: April of 1934. How long after that was it this visit was made to Osthy?

The Witness: Well, that was in my summer vacation the following year.

The Court: The following year. Not the same year?

The Witness: No. My father went down there by himself, but I wasn't along on that.

Q. How do you place it as the summer vacation of the following year? How do you distinguish between these times ten years ago?

Mr. Cooper: He told you that once.

A. I already explained that, that I was there for the one year and came back from Denmark and it was the following year that I went with my father down into the States.

Q. Fifteen months later, approximately fifteen to eighteen months later that you went to Osthy and Barton, according to your story? A. Something like that.

Q. And you have no written memorandum or anything else to show the time? A. I believe that that can be very easily established by my passport.

Q. I am not talking about the time you came back from Denmark: You didn't use the passport after that? A. No, I always used that passport in crossing the border from Canada to the United States.

Q. You did that up to 1938, did you not? A. No, because I applied for a permanent entry card and that was used at a later date.

Q. At what time? A. I believe that was in—

316 *Defendant's Witness, Victor D. Werner, Direct*

Q. Suppose you get it. A. I can't have that. That was turned in when I became a citizen.

Q. You don't know when it was or for how long a period you were working on this passport card? A. No, but I still have my passports and the dates are all on there and stamped on there.

Q. Suppose you get that and let's see just how long a period it was that you came in on the passport.

The Court: When can you get that?

The Witness: I can get that today.

317 The Court: Bring it tomorrow.

Mr. Groner: That is all, sir.

Mr. Cooper: All right.

VICTOR D. WERNER, called and sworn on behalf of the defendant, testified as follows:

Direct Examination by Mr. Cooper:

Q. Mr. Werner, you reside in New York City? A. Yes, sir.

318 Q. And you are a member of the Bar of New York City in active practice? A. I am, sir.

Q. And among your clients have you the Mr. Jungersen who is a party to this suit? A. Yes.

Q. In connection with his business you have had to do with the licensing under the patent that's here in suit, have you not? A. Yes, sir.

Q. For how long a period has that been true? A. I started in connection with the collection of royalties and the negotiation of certain license agreements in the latter part of 1938, and on April 1, 1939, I took over the collection of all royalties under existing license agreements.

and since that date I have collected most of the royalties from Mr. Jungersen's licensees.

Q. Now, this has to do with the licenses in the jewelry business? A. Yes, sir.

Q. How many of those licenses are there? A. There have been a total, according to my records, of 55 licenses. There have been two or three that have been cancelled for failure to pay royalty and one or two of those because the licensee became bankrupt.

Q. Have you any record of the total amount of royalties that have been taken? A. From the year 1938 up to October 16, 1945, according to records which I have kept and records which have come into my possession, there is approximately $120,000 of royalties collected. $10,250 of that I just noticed were from foreign collections. So that the collections that I have a record of are about $110,000. 320

Q. Now, these foreign licenses you did not negotiate yourself? A. No, I did not. The only reason I have that is because along in '38, I think, I made Mr. Jungersen's income tax out in connection with the trips back to Denmark.

Q. Will you explain to the Court in general on what the rates of royalties are based? A. Well, the early contracts were on a basis of per casting. Five cents per casting of gold or gold alloys and ten cents per casting of platinum or platinum alloys. These contracts, some of them, were prepared early by, I believe, a Canadian patent attorney. Then we have contracts which followed along in '39 or thereabouts where the rate was five cents per pennyweight of gold or gold alloys, and ten cents per pennyweight of platinum or platinum alloys, or any ring or article of jewelry containing platinum. Then a third basis was a flat royalty agreement whereby $1,000 a year was paid for all castings in one factory and those agreements came into being about April of 1940. We 321

322 *Defendant's Witness, Joseph Robinson, Direct*

have always tried to keep them in existence, so that up until recently the two forms have been the only ones that have been used, and that is the five cents per pennyweight of gold, ten cents per pennyweight of platinum, and the $1,000 a year. However, the $1,000 a year contract has been practically discontinued. There is an additional rate in recent contracts of, I believe it is, five per cent of net sales of articles made of silver.

Q. That's the first time you have mentioned silver? A. Yes.

323 Mr. Cooper: That's all.

JOSEPH ROBINSON, called and sworn on behalf of the defendant, testified as follows:

Direct Examination by Mr. Cooper:

Q. What is your occupation, Mr. Robinson? A. Development engineer.

Q. Have you had particular relation to casting, the
324 casting of fine articles such as articles of jewelry? A. Well, with the government under the title of head engineer for the War Production Board, one of my assignments was investigation of procedure in casting to widen its movement into the war production program. I haven't had direct identity with the casting—that is, I personally have not done casting of jewelry by this process here under consideration.

Q. You have studied in connection with procedure in casting, the casting of jewelry? A. Yes.

Q. Are you familiar with the Jungersen patent that is here involved, 2118468? A. In a general way.

Q. Are you familiar with the patents other than the Jungersen British patent, which I will exclude from your consideration because it is not prior to the patent in suit, that are included in this book of prior art which the plaintiff in this action has served upon the defendant as embodying the important references on which it relies here?

* * * * * *

A. Your Honor, in the course of the investigation by the War Production Board of this subject, a patent study was made for the Board by an attorney here in New York, 326
named Luce, I believe, or Luke, Henry J., and I had access to that study. I observed in this file some of the patents that were included in that study. I do not remember that each of these patents here disclosed was shown in that study. So that in a general way I am familiar with the content of this file.

The Court: All right.

By Mr. Cooper:

Q. What have you to say as to whether any patent in that file or any publication in that file shows the Jungersen process for casting articles of intricate design that is embodied in the patent in suit? 327

Mr. Groner: Pardon me, Mr. Cooper. I object to that question. I don't think this witness has qualified himself as knowing anything about casting.

The Court: I don't think he has. I don't think you have qualified him yet. If it is merely a question of his qualification, you had better proceed.

Q. Well, about your qualifications for casting, I understood you to say you had been employed by the Government in the making of an intensive study of casting articles of intricate design: is that correct? A. More exact-

328 *Defendant's Witness, Joseph Robinson, Direct*

by Mr. Cooper, my work was to investigate the general subject of precision casting, what we call the expendable wax pattern process, which is—

The Court: Well, what had been your experience before your employment with the Government for this purpose?

The Witness: In the actual practice—

The Court: So far as casting is concerned, or so far as your knowledge of patents connected with casting is concerned.

329 The Witness: I have been a foundry man, done all the work that is incident to the education that one receives in practice and in schooling and engineering, but I have not practiced this particular process.

The Court: But the general principles involved therein you are familiar with?

The Witness: I am familiar with, yes, and as to patents—

The Court: And the general principles behind casting as such?

The Witness: Yes, your Honor. I have had wide experience in patent development work.

330 The Court: All right. Now, ask your question.

Q. Now, I will ask you the question: Do any of these patents or publications—

The Court: In your opinion.

Mr. Cooper: Yes.

Q. (Continuing) —in your opinion, that are embodied in this compilation by the plaintiff here, disclose the process of the Jungersen patent in suit, No. 2,118,468, as you understand it? A. Allow me, please, to name the patents with which I am familiar. The Spencer patent, the Hazeltine patent and the Duke English patent. I am not familiar with the other patents. Now, as to those

three patents, in my opinion, they, neither of them, teach the casting of jewelry as it is disclosed by the Jungersen patent.

The Court: Do they teach any casting similar or comparable to this Jungersen patent?

The Witness: I would say that the Duke patent teaches a method of making rubber moulds which is similar to the Jungersen process. I do not think it is the same. I wonder whether there is a patent in here named Kralund, K-r-a-l-u-n-d. I think it is. Those two patents, if I may answer— 332

Mr. Groner: Which are those two?

The Witness: The Kralund and the Duke patents, if I may answer in this way, with propriety, I have always had in my mind as being the closest references to the Jungersen process.

Q. But neither of them disclose it, in your judgment? A. In my opinion, they do not.

Q. That Kralund patent is 1,238,789? A. That's right.

Q. That's the one you had in mind? A. That's the one.

Q. And the other one that you mentioned particularly was— A. The Duke, an English patent. 333

Q. Duke? A. Yes.

Q. Duke British patent 7452 of 1892? A. Yes. Those are the two patents.

Mr. Cooper: All right. You may examine.

Cross Examination by Mr. Groner:

Q. Mr. Robinson, if you undertake to cast a molten metal into some form of mould, whether it be a die or other multi-part metal mould, or into an investment, and you don't get, with proper temperature, a correct or a

complete casting, do you not habitually apply force, either hydraulic force or centrifugal force or die pressure casting force, or some of the variants of applied force? A. Yes.

Q. Is there any difference in the effective force of molten wax and any other molten material? A. I would think there might be some.

Q. Can you name any? A. I would think that the greater fluidity of the wax would make it more responsive to force and therefore would produce in its effect a finer definition.

335 Q. So that it would be even more natural to apply force to the molten wax than to the molten metal, for example? A. Where a precise definition is desired I would say yes.

Q. Is there any distinction in your mind between the various methods which might be applied to exert force on the casting?

The Court: What do you mean distinction?

Mr. Groner: Any distinction in result, if it please your Honor.

The Court: Distinction in method—oh, you mean whether the centrifugal method or the direct application would produce a different result phys-

336 ically?

Mr. Groner: Exactly, your Honor.

A. I would think, Mr. Groner, that centrifugal force would have in this type of casting a distinct advantage. I base that upon the assumption that centrifugal force as we all know is uniform in its effect and should tend, and I would expect it to tend, and I believe it does tend, to produce a finer filling of the mould cavity with the wax or the mould cavity with the metal as the case may be.

Q. Well, now, Mr. Robinson, isn't it a fact that some of the pressure means, as for example, die pressure cast-

ing or the use, for example, of a syringe, or both, was the exercise of positive force for the purpose of filling the cavity? A. That is a good question. In certain types of casting by this process we have found in many cases that air pressure behind the molten metal was a satisfactory method.

The Court: Was?

The Witness: Was, your Honor.

A. (Continuing) We found that static casting to build up heavy weight—that is to say sprue behind the molten metal does in itself build up heavy weight—in order to press the mould upon the casting was a satisfactory method. On the other hand, in smaller parts some radar pieces and other small parts, we found centrifugal force was the most satisfactory method. 338

Q. And that is true as you found according to your experiences with W. P. B. in preference to some of the direct piston and cylinder methods as for example die pressure casting? A. That is my experience, yes.

Q. You mentioned the Kralund patent. The Kralund patent does use applied force in both of its casting operations, does it not? A. Applied force?

Q. Yes. A. Yes, it does. 339

The Witness: I might say to the Court I came in as a spectator, not expecting to be a witness.

A. (Continuing) The Kralund patent, of course, is dealing in large pieces, casting large pieces. As I remember the patent, I think it states that the object of the patent is to go beyond pieces weighing two or three pounds up into larger pieces and the purpose was to protect and save the mould. When you get into die casting in substantial sized moulds, metals of high temperatures, the moulds deteriorated and the object there was to save the moulds by resorting to the wax.

340 *Defendant's Witness, Joseph Robinson, Cross*

Q. Now, aside from the purpose expressed by Kralund is there any disqualification of the method for the casting of small objects? A. That question I will have to answer in this way that I think there is a distinction. I think that the Kralund process would be less applicable to small pieces than to large pieces.

Q. What is the basis for your opinion there? A. The basis of my opinion is that the type of the core caused by Kralund—it is not typical for it and the draw in cavities of the mould is apt to be less uniform than in
341 the smaller pieces.

Q. Is there any difference in basic effect between the use of a syringe which constitutes a piston in generally a glass cylinder and the general motive power of a die casting machine? A. Of course, they are fundamentally the same.

Q. They both employ the piston? A. They are fundamentally the same but there are differences; you could have air in your syringe.

Q. So that if you have air in your syringe the syringe would work less perfectly than the die casting? A. I would expect it to.

Q. And at all events it works with less pressure? A.
342 Yes.

Q. That is all, your Honor.

* * * * * *

Mr. Cooper, Jr.: I will offer in evidence exhibits marked for identification D-4, D-5, D-6, D-9, D-10 and D-11.

* * * * * *

(Received and marked Exhibits D-4, D-5, D-6, D-9, D-10 and D-11.)

* * * * * *

Newark, N. J., Wednesday, October 24, 1945. 343

(Trial resumed pursuant to adjournment.)

(Appearances as before noted.)

Mr. Cooper: If your Honor please, in the examination of Mr. Jungersen yesterday he was asked to produce any early letters he could find from Cohen & Rosenberger of Providence, Rhode Island, and with the agreement of my brother on the other side, without recalling Mr. Jungersen, I produce a letter of January 10, 1935, from Cohen & Rosenberger to Mr. Jungersen on the subject. 344

The Court: Mark it in evidence.

(Received and marked Exhibit D-16.)

Mr. Groner: And I should like to adopt their Exhibit D-14 as Ostby & Barton Exhibit 1; I believe it will be called P-1.

(Received and marked Exhibit P-1.)

Mr. Groner: As Ostby & Barton Exhibit P-2, I should like to introduce the Chicago depositions 345 which have been cited and referred to as C-D, which includes the testimony having to do with the Slatis-Dee prior use, and which is part of the testimony of the Austenal prior use.

The Court: All right.

Mr. Groner: May we have that marked as P-2?

The Court: P-2.

Mr. Groner: * * * Now, in connection with the Slatis deposition, a considerable number of

exhibits were offered, some of which are purely cumulative. We have attempted to pare down so as not to encumber the record any more than necessary and to that end I should like to offer defendant's exhibits, and I hope they may continue to bear the designation that's hitherto been given them, because there are constant references—Exhibits C-1, C-3, C-7, C-13, C-19, C-24, C-30. They are photographs of certain of the physical exhibits.

The Court: Well, they may be introduced as part of P-2. * * *

* * * * * * *

(Received as part of P-2.)

* * * * * * *

Mr. Groner: Fine. Thank you, your Honor. Additionally, I should like to offer C-41, C-42 and C-43, which are three other paper exhibits connected with that Slatis prior use.

The Court: The same procedure will be followed in that; they will be entered as a part of P-2.

(Received as part of P-2.)

* * * * * * *

Mr. Groner: * * * I now come to some of the exhibits having to do with the Austenal prior use. I introduce as Ostby and Barton Exhibit P-8 a dental plate to which is attached a Steele's backing. Its purpose in this case is explained in the depositions. * * *

(Received and marked Exhibit P-8.)

Mr. Cooper: What was its number before?

Mr. Groner: I beg your pardon, Mr. Cooper. It was C-44. I should have stated that.

And as P-9 I should like to introduce six documentary exhibits, being five letters and a drawing heretofore introduced in connection with the Austenal deposition and being known as C-45, C-46, C-47, C-48, C-49 and C-50.

The Court: Mark them as one exhibit. 349

(Received and marked Exhibit P-9.)

Mr. Groner: As Ostby and Barton Exhibit P-10 I should like to introduce the New York depositions heretofore taken on behalf of Ostby and Barton, these being the balance of the testimony having to do with the Austenal prior use.

(Received and marked Exhibit P-10.)

Mr. Groner: As P-11 and P-11A—I make the distinction because they are quite similar, your Honor, and there might be confusion as reference might be made to one and not the other—I should like to introduce two flasks in which rubber moulds are asserted to have been made by Austenal. They hitherto bore the numbers, the exhibit designations, NY-23 and NY-24. 350

Mr. Groner: NY-23 should be P-11, and NY-24 should be P-11A.

(Received and marked Exhibits P-11 and P-11A.)

Mr. Groner: As Ostby and Barton Exhibit P-12 I should like to offer three exhibits hitherto known as NY-25, NY-26 and NY-27, being parts of two Austenal letters and the drawing which is a part of P-9, but to which has been added certain characterizing letters and that sort of thing. 351

(Received and marked Exhibit P-12.)

Mr. Groner: I should like to offer now as Ostby and Barton Exhibit P-19 the patent book which we sent to your Honor three or four days ago along with the trial brief.

(Received and marked Exhibit P-19.)

352 *Defendant's Witness, Jacob H. Schaeffer, Direct*

Mr. Groner: * * * As Ostby and Barton Exhibit P-20 I should like to * * * offer the chart which has been attached as an appendix to the Ostby and Barton trial brief * * *.

Mr. Cooper: * * * I have no objection to his using it in a demonstrating way but I don't think it is evidence. * * * I object to it as being wholly argumentative and not evidence at all.

The Court: It seems to me that that's true, Mr. Groner. * * * Now, is there any contest as to
353 the accuracy of the citations as far as the statements made are concerned?

Mr. Cooper: No, not as to the accuracy.

The Court: I will admit it.

* * * * *

(Received and marked Exhibit P-20.)

* * * * *

JACOB H. SCHAEFFER, called and sworn on behalf of the defendant, testified as follows:

Direct Examination by Mr. Cooper:

354 Q. Where do you live, Mr. Schaeffer? A. 41 Eastern Parkway, Brooklyn, New York.

Q. And where is your business location? A. 234 West 39th Street, New York.

Q. What is your business? A. Jewelry making.

Q. And what is the name of your firm? A. Shiman Brothers & Company, Incorporated.

Q. What is your position with that firm? A. Secretary.

Q. Are you by practice and profession a jeweler? A. I was.

Q. You were? A. Yes.

Q. You learned the business, you learned the trade and practiced it at the bench? A. Yes, sir.

Q. Is there an association known as the Jewelers Craft Association? A. Yes, sir.

Q. Explain what that is briefly. A. It is a manufacturers association.

Q. A manufacturing jewelers' association? A. Association.

Q. Yes. And have you held positions in that? A. Yes.

Q. What? A. I was president for quite some time and am now secretary and treasurer.

Q. And to what extent does that include the jewelry manufacturers of the country? A. It includes most of 256
the gold ring manufacturers, the larger manufacturers in New York City.

Q. And what is your particular company's business? A. Manufacturing of ring mountings.

Q. Any particular kind of ring mountings? A. Yes, mostly diamond ring mountings.

Q. How long has your firm been in the business? A. Our firm has been for about 50 years.

Q. And how long have you been in the business? A. About 43—with that firm.

Q. At all times with the one concern? A. Oh, no; pardon me. I mean 43 with this concern.

Q. Yes. A. About two or three years prior. 257

Q. Yes.

The Court: You must have started pretty young.

The Witness: At about 13 or 14.

Q. How do you make your rings, your company, now? A. By rubber mould casting, 95 per cent.

Q. Are you a licensee under the Jungersen patent? A. We are.

Q. To what extent do you make them by the Jungersen method? A. About 98 per cent.

Q. What do you do with the other 2 per cent? A. Die stamping.

358 *Defendant's Witness, Jacob H. Schaeffer, Direct*

Q. Is that a case where you have old dies whose product is called for now? A. Yes, sir.

Q. About when did you take this license from Mr. Jungersen? A. I can't remember the exact date, but somewhere between eight or nine years ago.

Q. How did you make your rings before Mr. Jungersen's practice was installed? A. Mostly with dies and tools.

Q. And what do you mean by tools there?

The Court: Handmade, you mean, with tools?

359 The Witness: No.

The Court: What?

The Witness: No, your Honor: mostly with dies. We stamp out forms—

The Court: Then you said with tools.

The Witness: Well, we have to make tools for blanking them and then—

The Court: In co-operation with the dies, you mean?

The Witness: With the dies. We make blanking tools and then we make dies that form up the blanks.

Q. Why did you go to the Jungersen method? A. It was simpler and we didn't have to spend so much money

360 in making expensive tools and dies.

Q. Can you give the Court an idea of the expense of a die for a fairly intricate ring? A. Depending on the style and design it would run anywhere from $500. to $2,000.

Q. And what is the expense of making a ring by the Jungersen process? A. Anywhere from twenty-five to seventy-five dollars.

Q. What was your average expense per year in making dies before you took the Jungersen process? A. Between thirty and forty-five thousand a year.

Q. Did you make any by the cuttlefish process? A. Yes, sir.

Q. You do not do that now? A. No, sir.

Q. Was that objectionable?

The Court: What's your cost for the apparatus under the Jungersen patent, a year?

The Witness: What do you mean by the cost, your Honor?

The Court: Your dies cost you twenty-five or thirty-five thousand a year before. Now what is the corresponding cost under the Jungersen method?

The Witness: Well, formerly we would employ about ten to twelve or sometimes fifteen tool makers making 362
tools. Today we employ one or two model makers who make the models, and then we have a young girl that makes the moulds, and that's the total cost.

Q. Well, what is the overall expense of the equipment you use in making them by the Jungersen method?

The Court: You have given an appraisal of twenty-five or thirty-five thousand dollars a year for your die making cost. Now what is the comparable expense under this new method?

The Witness: You mean, your Honor, the expense of making—

The Court: I mean you arrived at a certain figure for 363
the die making process; namely, twenty-five or thirty-five thousand a year. Now what is the comparable expense under the new system?

A. We used to spend upward of twenty-five or thirty-five thousand a year making dies and tools only for the process, for the designs.

The Court: Yes.

The Witness: In our sample line, and from this amount of money we will probably get between forty and fifty designs a year, new samples. Today we spend from

364 *Defendant's Witness, Jacob H. Schaeffer, Direct*

twelve to fifteen thousand a year and we get upward of a hundred designs a year. Formerly the designs we got out with dies and tools would need a lot of bench labor. Today we can get out five times or more of the amount through this process with less labor.

The Court: All right.

Q. Well, are there models that you use to lay for your rings that could not be used by the die process?

The Court: Could not be made by the die process, you mean?

365 Mr. Cooper: Yes, could not be made by the die process.

A. That is correct.

Q. After the ring is cast by the Jungersen process, what is required then to finish it? A. A little bench labor.

The Court: Polishing?

The Witness: And then polishing.

Q. What do you mean by a little bench labor? What does the bench labor consist in? A. Why, we have automatic grinding machines that grind off the sprue that is left on after casting, and then we do a little sizing,

366 and then it is sent in the polishing room.

Q. From your position with the Jewelers Craft Association are you familiar with the general conditions in the trade of making these fine rings? A. We have a general knowledge.

. . . . . .

Q. Do you make platinum rings by the Jungersen process? A. Yes, sir.

Q. Now, prior to Jungersen did you know of any method that could have produced work like that produced by the Jungersen method? A. No, sir.

Q. Did you ever hear of the use of die casting in the jewelry trade? A. No, sir.

. . . . . .

Q. Now, in conducting the work under the Jungersen process, do you need any what might be classed as fine jewelers except for your designs? A. No, sir.

Q. The work is conducted by ordinary labor? A. We still employ good jewelers, but we don't need so many extra skilled mechanics that we used to need.

Mr. Cooper: You may examine.

368 Mr. Groner: No cross examination, if it please your Honor. In that connection I hope it is fair for me to state that Ostby and Barton do not contend that the stamping or cuttlefishing or sand casting are proper comparisons with this method. We make no contest on that score at all. This is, it seems to me, a red herring, or at best a straw man.

The Court: He might be your witness, practically.

Mr. Groner: Almost, if it please your Honor.

Mr. Cooper: All right. Of course, in answer to my brother—

369 The Court: I mean, that is what he thinks. What you think or what I might think is not necessarily in accord with that.

Mr. Cooper: We described the only methods that have been used in jewelry manufacturing. All right. That is our case, if the Court please.

. . . . . .

370 *Plaintiff's Witness, Royal J. Gregg, Direct*

ROYAL J. GREGG, called and sworn on behalf of the plaintiff, testified as follows:

Direct Examination by Mr. Groner:

Q. Mr. Gregg, will you state your name and your age and your occupation, please, sir? A. Royal J. Gregg, age sixty-five, vice president of American Associates, Inc., and general manager of Ostby and Barton Division of American Associates.

Q. Were you prior to September of this year the president of Ostby and Barton? A. I was.

371 Q. And for how long were you president? A. Since May, 1939.

Q. How long have you been with Ostby and Barton, Mr. Gregg? A. Since January, 1906.

Q. And in 1934-5 or thereabouts, what was your position with Osby and Barton? A. As secretary-treasurer.

Q. Did you retain that position until you became president? A. I did.

Q. And I think you said you became president in 1939? A. Right.

Q. Do you know Al Stein? A. I do.

Q. Under what circumstances did you come to know
372 him? * * * A. He called at our office for the purpose of getting us interested in the casting processes.

Q. At the time he called, Ostby and Barton did no casting? A. None.

Q. Did you enter into a contract with Mr. Stein? A. We did.

Q. And was that contract in writing? A. It was.

* * * * * * *

Q. Do you know when or about when the contract was made? A. March, 1936.

Q. I hand you now what purports to be an original instrument entitled, "Agreement between Al Stein and Ostby and Barton Company re special casting process."

and which appears to be signed by Al Stein and by Ostby and Barton Company, by R. J. Gregg, secretary, and ask if you can identify that as the contract to which you have referred? A. It is.

Q. And it bears the date on or about the date you just referred to? A. Correct.

Q. And is that your signature? A. It is.

Mr. Groner: I should like to present this contract, if it please your Honor, as Ostby and Barton's Exhibit P-22.

374 Mr. Cooper: Your Honor, I will note the same objection and stand on my exception, of course.

The Court: I shall allow it.

(Received and marked Exhibit P-22.)

Q. To your knowledge did Stein, in accordance with the contract, teach Ostby and Barton or an employee or employees of Ostby and Barton how to cast metal such as rings? A. He did.

Q. To whom specifically did he teach his process? A. Leon Gossett.

Q. I believe you testified that prior to the time you made this arrangement Ostby and Barton had done no jewelry casting; is that correct, Mr. Gregg? A. That is 375 correct.

Q. And Ostby and Barton had been during that earlier period a stamping house entirely? A. Yes, sir.

Q. Does Ostby and Barton still make rings by stamping? A. They do.

Q. Can you state the proportion of stamped rings and the proportion of cast rings? You can make that a rough approximation, if you care. A. In my estimation stamped rings are twenty to twenty-five to one of the cast rings.

Q. So that they run above eighty per cent?

The Court: You mean twenty-five times as many die made rings—

376 *Plaintiff's Witness, Royal J. Gregg, Direct*

The Witness: That's right, yes, sir.

The Court: You have of the casting rings?

The Witness: Yes, sir.

The Court: Now, are these from new dies continually made or from old dies that you had?

The Witness: Both.

Q. Do you know the defendant Mr. Jungersen? A. I do.

Q. Can you state when and under what circumstances you met Mr. Jungersen? A. My recollection is that it
377 was in 1934, at which time he called at our office and I met him for the first time.

Q. When you first met Mr. Jungersen did you learn from him the method which is now disclosed in his patent? A. I did not.

Q. What did you learn from him at that time? A. Personally I learned nothing as to his method. He simply showed us some work which he was doing by his casting method.

Q. And when you speak of some work your mean maybe some rings or something of that nature? A. That's right.

Q. Did you see him subsequently to that time, Mr. Gregg? A. I did, yes, sir.

378 Q. Did you at any of these subsequent occasions and up to the time his patent issued in 1938, learn anything from him as to the method employed by him? A. I did not.

Q. Did he show you any moulds? A. I cannot recollect that he showed me any personally.

Q. Do you know whether he showed anyone else connected with Ostby and Barton any moulds? A. Not to my knowledge.

Q. Are you generally familiar with the jewelry manufacturing business? A. Yes, to a limited extent.

Q. Are you a member or officer of any associations? A. I am.

Q. Would you mind stating what? A. I am a member of the New England Jewelers' and Silversmiths' Association.

Q. That, I take it, is limited to New England in its membership? A. Practically so, yes. Also a member and director of the Jewelers' Board of Trade.

Q. Is that national or limited in scope? A. National.

Q. In your general business capacity or in your capacity as a member and director of those associations, are you familiar with the representative jewelry firms of the United States? A. Yes.

380

Q. Have you made a list of what you regard as the outstanding manufacturers who engage in casting? A. Yes.

Q. About how many names are on that list? • • • A. Possibly 20 or 25.

Q. And they are companies generally comparable in size and in the amount of business done with Ostby and Barton? A. Nearly so, yes.

The Court: Well, how big is Ostby and Barton?

The Witness: We have a rating of up to a million dollars in both Dun and Bradstreets and in the Jewelers' Board of Trade.

381

The Court: What is your volume in rings in the course of a year?

The Witness: Dollar volume or numerical volume?

Q. Give us both.

The Court: Give the numerical volume.

The Witness: I cannot give the numerical volume.

The Court: What is the dollar volume?

The Witness: In excess of two million dollars.

Q. How many of those twenty to twenty-five firms, to the best of your knowledge, are licensees under the patent in suit? • • • A. So far as I know, five or six at the most.

382 *Plaintiff's Witness, Royal A. Gregg, Cross*

The Court: And do you know how the balance make their rings other than by casting?

The Witness: Only from a general knowledge I believe they do mostly stamping, largely stamping.

Q. Now, Mr. Gregg, when you say you believe they do mostly stamping, you mean that the twenty-five that you have referred to do mostly stamping, do you not? A. Yes.

Q. So of the twenty-five your belief is that about five are licensees under the patent in suit? A. Right.

383 Q. And the rest of them do casting?

The Court: By other methods?

The Witness: Die casting; I don't know by what methods.

The Court: How do you know that five of them are licensees under Jungersen, that only five of them are?

* * * * * * *

Mr. Groner: We will be delighted to make those twenty or twenty-five firms available to Mr. Jungersen so that there can be a check on that.

* * * * * * *

384 *Cross Examination by Mr. Cooper:*

Q. Name these twenty or twenty-five prominent ones that you have in mind, Mr. Gregg. A. Name them?

Q. Yes. A. May I read them?

The Court: Yes. If you have a list, read them off.

Q. Yes, if you have a list. Of course. A. Will you state the question, what names you want? What are they?

The Court: You have mentioned twenty or twenty-five outstanding groups comparable in size to the Ostby & Barton Company who made rings by the casting process.

A. Otto Baer.

Q. B-a-e-r? A. B-a-e-r, Buffalo.

Q. Yes. A. Schwartz Jewelry Company, Buffalo.

The Court: Otto Baer, Buffalo and Schwartz Jewelry Company of Buffalo.

A. (Continuing) Star Ring Manufacturing Company, Buffalo; Milton Reich, Buffalo; J. R. Wood & Sons, New 386
York; B. F. Hirsch Company, New York; the California Ring Manufacturing Company of Los Angeles; Koke Standt & Company of Los Angeles; Granat Brothers, San Francisco; Bojar, Providence; Heller & Company, Providence; Thomas Poole, Providence; Sammantio & Sanchirico, Providence; Herf-Jones Company, Indianapolis; Goodman & Company, Indianapolis; Eisenstadt Manufacturing Company, St. Louis; Jacquard Jewelry Company, Kansas City; Burr-Patterson & Auld Company, Columbus; Jones & Woodland Company at Newark; Jabel Ring Manufacturing Company, Newark; Simon Manufacturing Company, Newark.

That completes my list. 387

Q. How many of those companies do you know well, Mr. Gregg? A. (No answer.)

Q. You know all of those at Providence, I suppose. A. I know all at Providence, Los Angeles, Kansas City, St. Louis, and perhaps a lesser knowledge of the rest of them.

The Court: How about at Newark?

The Witness: At Newark? I know a portion of these only.

Q. Have you talked with any of these concerns or have your associates to your knowledge talked with any of

388 *Plaintiff's Witness, Royal J. Gregg, Cross*

these concerns about Mr. Jungersen's process? A. Not to my knowledge, no.

Q. You have never, yourself? A. I can't say that I have.

Q. Well, can you say that you have not? A. Right.

Q. What? A. I have not.

Q. Who was Stein? A. Stein was a man that had knowledge of a casting process and called upon us to offer his services to teach us the methods.

The Court: Was he a jeweler or had you known him
389 before?

The Witness: Personally I had not, no.

The Court: Well, do you know whether he had been a jeweler, or what was he?

The Witness: I can't say, because I was not in the active production end of it at that time.

Q. You didn't come in contact with him personally? A. I did.

Q. Well, did you personally make the deal with him? A. I signed the contract.

Q. At somebody else's instance, in your company? A. That might have been so, yes.

390 Q. According to your recollection, wasn't it so? A. Well—

The Court: What we are trying to get at is, to whom was the idea of the Stein process sold in your company?

The Witness: Well, there it was to our practical—practical men, yes, practical men.

The Court: Well, who was that?

The Witness: Mr. Raymond Ostby and Mr. William L. Marchant.

The Court: And you simply, as the officer of the company, signed the contract?

The Witness: That's right.

The Court: Without having had anything to do about the acceptance of the terms and so forth, or the acceptance of the idea?

The Witness: That's correct.

Q. Well, wasn't Gossett a factor in it? A. Not at that time.

Q. But I thought you said that Stein taught Gossett. A. Well, he did after ye had entered into the contract with him.

Q. Didn't he teach somebody about the process before the contract was made? A. Well, he might have told the 392
two gentlemen that I have just mentioned; he might have explained it to them.

Q. Well, at the time this contract was made you had been having contacts with Mr. Jungersen, hadn't you? A. Well, I saw Mr. Jungersen once in 1934.

Q. You said that he came back there and saw others in the company, I believe. A. That's correct.

Q. And some of those visits were about the same time that Stein came in on you, weren't they? A. I don't recollect the dates.

Q. Well, are you prepared to say that Mr. Jungersen was not submitting his process to you at the very time
that you made your contract with Stein? A. No, I am 393
not.

Q. Can you give me the figures that represent the cast rings per year made by your company? * * * A. That would be in numerical quantities, for the past year between fifteen and twenty thousand rings.

Q. Cast? A. Cast.

Q. Yes.

The Court: Can you give us any idea of how many were made by the die process?

The Witness: No—

The Court: Whether the ratio was about 25 to 1 or 20 to 1?

394 *Plaintiff's Witness, Royal J. Gregg, Re-direct*

The Witness: It was 25 to 1, I think.

The Court: Well, that would be 300,000 rings.

The Witness: Better than that, yes.

The Court: Better than that?

The Witness: Yes; of all types.

Q. Now, these rings that are made by the stamping process are mostly made from old dies already in your possession, are they not? A. A certain percentage of them are.

395 The Court: What percentage would you say?

The Witness: Well, a design made from a die like that we usually run from two to three years. We keep adding a few additional dies, new designs every year, and discarding them, in about an equal amount.

Q. When you say you add a few dies every year, what does a "few" mean, twenty or thirty? A. Perhaps between thirty and fifty new items.

Q. A year? A. Yes.

Q. And the rest of your product in stamp dies is from the old dies? A. Right.

Mr. Cooper: All right.

396 *Re-direct Examination by Mr. Groner:*

Q. Excuse me, Mr. Gregg; just two more questions. You referred to Mr. Raymond Ostby and to Mr. Marchant, who were present at some meetings with Mr. Jungersen. A. I did.

Q. Mr. Ostby has testified by deposition in this matter, has he not? A. He has.

Q. And Mr. Marchant is dead? A. Right.

Q. Mr. Cooper asked you some question having to do with the submission by Mr. Jungersen to Ostby & Barton of his process. I simply want to make it clear. Did Mr.

Jungerstn ever to your knowledge submit his process in the sense of disclose his process to anyone at Osthy & Barton? A. Not to my knowledge.

Mr. Groner: That's all.

Re-cross Examination by Mr. Cooper:

Q. But you are not prepared to say that he did not disclose it—

The Court: Well, he simply testifies that to his knowledge he did not. 398

Mr. Cooper: Yes.

Q. Well, you were not in this ring end, ring producing end of the business at any time, were you? A. No.

Q. And your contact with the thing was wholly as a general officer of the company, not interested in that particular branch? A. Well, I was called upon to sign the contract.

Q. And that's all you know about it.

The Court: You were in the business end.
The Witness: That's right.
The Court: Not in the production end.
The Witness: That's right. 399

The Court: All right.
Mr. Cooper: All right.
Mr. Groner: That's all, Mr. Gregg. Mr. Dixon, will you take the stand?

400 *Plaintiff's Witness, Alfred E. Dixon, Direct*

ALFRED E. DIXON, called and sworn on behalf of the plaintiff, testified as follows:

Direct Examination by Mr. Groner:

Q. How old are you, Mr. Dixon, and what is your occupation? A. I am 48, and I am in charge of the designing at Ostby & Barton.

Q. How long have you been a designer for Ostby & Barton? A. About ten or eleven years.

Q. Do you know Al Stein? A. I met the gentleman.

Q. Did you ever learn his method of casting metal
401 articles? A. Not directly.

Q. Well, did you ever learn his method of casting metal articles? A. I learned it after he had taught Gossett.

Q. And you learned from Gossett? A. That's right.

Q. Can you place when that was? A. He came in in 1936, in the spring; I think the date was about March.

Q. And did you learn it at or about that time? A. No, I learned it later.

Q. Well, how much later? A. Well, within a month, I should say.

Q. Is Ostby & Barton still following the process which you then learned? A. Yes.

402 Q. In May, 1941, the plaintiff, Ostby & Barton, filed in this case its response to defendant's request for particulars. That response has been introduced here as Jungersen deposition D-2 and it purports to contain a statement of the method employed by Ostby & Barton. Have you read that statement? A. I have.

Q. Is it a correct statement? A. It is, as far as it goes.

Q. Now, have there been any variants on the methods practiced by Ostby & Barton since that statement was filed in this case? A. We have had—

Mr. Cooper: Well, I will object to that.

Mr. Groner: May I interrupt you, Mr. Cooper?

Mr. Cooper: Go ahead.

Mr. Groner: This is not an attempt to avoid infringement to the extent that infringement is involved in the particulars. It is simply to give a full picture. There have been certain detailed changes in the method since the response was filed. In fact, I don't think they make an iota of difference—

The Court: Well, if it doesn't make an iota of difference—

Mr. Groner: But Ostby & Barton desires—

404 The Court: If it doesn't make an iota of difference, why bring it in?

Mr. Groner: Simply, your Honor, if we didn't bring it in, there might be the accusation that we were withholding something.

Mr. Cooper: No, if your Honor please—

Mr. Groner: We have changed from a syringe—

The Court: No, never mind, never mind; skip it.

Mr. Groner: Very well.

Q. Do you have any mould illustrative of those used by Ostby & Barton since 1936 in the making of the wax patterns? A. I have.

405 Q. I hand you a multi-part metal mould, the two casings or covers of which are marked on their inner face 29, and ask if that is such a mould as you just referred to? A. That is a typical mould.

Q. Will you show it to his Honor and show him how it operates?

The Court: Now, wait a minute. What's the whole thing called?

The Witness: This is the outer mould, an all-metal mould.

The Court: An all-metal mould.

The Witness: And inside—

406 *Plaintiff's Witness, Alfred E. Dixon, Direct*

The Court: It consists of two outer parts.

The Witness: That's right.

The Court: Is that right?

The Witness: Yes.

The Court: Now, inside—go ahead; you describe it.

The Witness: Inside there are positioned three to five moulds, which are made—

Mr. Groner: Mould parts, you mean?

The Witness: Mould parts, which are positioned around the original model which is made by hand, after which the
407 original model is removed and the two parts are put together.

Mr. Groner: The two cover parts, you mean?

The Witness: The two outside parts are put together. Then we pour wax into the aperture. We formerly, originally used a syringe, and within the last year or two we have been using a pressure wax machine which forces the wax into the intricate—into the openings. After this is done we take the waxes out and they are placed on a sprue base around—

The Court: A sprue?

The Witness: That is a little base, and we stick these waxes in position and surround them with a metal cylin-
408 der. This metal cylinder is filled with an investment made of plaster of Paris and mixed to the right proportions, after which that is allowed to harden, and then it is put into an oven to burn out the wax and further harden the plaster of Paris. This is then taken out and put into a centrifugal machine into which the gold is forced by the centrifugal process. After that operation the cylinder is taken out and it is doused in water and the investment is destroyed. Then the rings are taken out of the cylinder, cooled off, we cut off the sprues, and the ring is ready for further continuation. I think that is the process.

The Court: Now, this exhibit which you have described is the one in which the wax is poured?

The Witness: That's right, sir.

The Court: And it is poured through the—

* * * * * * * * *

The Witness: Poured through the hole on the side here.

* * * * * * * * *

The Court: * * * Suppose you mark the hole through which the wax is poured. It is poured, is it?

* * * * * * * * *

The Witness: It is forced—the wax is forced in by a wax machine, pressure machine. 410

* * * * * * * * *

The Court: Suppose you mark it with a red pencil; just a circle. * * *

(The witness complied.)

The Court: * * * Now, that is the hole through which the wax is forced by a pressure machine?

The Witness: That's right.

* * * * * * * * *

Mr. Groner: May it please your Honor, I should like to introduce as Ostby and Barton Exhibit P-23 the mould to which the witness has referred, and which incidentally is a recently made mould, simply illustrative of the type. 411

The Court: All right. Let it be marked.

(Received and marked Exhibit P-23.)

Q. Mr. Dixon, I now hand you a box containing a number of small waxes. Were they recently made by you in the manner you have described and in the moulds which have just been introduced? A. Yes, they were.

Mr. Groner: I should like to introduce the box with the two or three or four illustrative wax pat-

412 *Plaintiff's Witness, Alfred E. Dixon, Direct*

terns made in the mould P-23, as Ostby and Barton Exhibit P-24.

(Received and marked Exhibit P-24.)

Q. I now hand you a cluster of rings on a rough base and ask you if you can state what that is. A. These are the rings which came out from the container.

Q. What do you mean, the container? A. The cylinder in which the waxes were originally placed and later burned
413 out. Then the gold had been placed in there, and this is the result.

Q. That, however, is not gold in this particular instance, is it? A. Those are silver, I believe.

The Court: Well, now, do they come out on this stand?
The Witness: Yes, your Honor.

Mr. Groner: That is the sprue, if your Honor please.

The Court: The sprue?

Mr. Groner: They are poured in through there and the waxes are invested or covered with this plaster of Paris material and all the metal is
414 poured into that, what is now the base. That is cut off, of course.

Mr. Cooper: Are they made in this mould?

Mr. Groner: They are made in the same mould, yes, Mr. Cooper.

The Witness: Yes.

Mr. Groner: And they too are recent. They are again simply illustrative.

The Court: Mark that P-25.

(Received and marked Exhibit P-25.)

Q. Mr. Dixon, I believe you have met Mr. Jungersen, have you not? A. I have.

Q. Can you place the time when you met him? A. My recollection is 1934.

Q. Did you learn from him then or at any time subsequent to then up to the time his patent issued his method of casting jewelry or other articles? A. I did not.

Q. Did you learn anything about that method? A. I did not.

Q. Did you see either the final articles or any of the devices used in the practice of his method? A. I simply saw some finished rings which he claimed had been made in his method, by his method.

Q. Did he ever disclose to you or anyone at Ostby and Barton to your knowledge any detail of the method which he practiced? A. Not to my knowledge. 416

Mr. Cooper: What was that answer?

The Witness: Not to my knowledge.

Mr. Groner: You may examine, Mr. Cooper.

Cross Examination by Mr. Cooper:

Q. I believe you said you weren't a technical man. What were you doing in 1934, Mr. Dixon? A. I was in charge of designing; that is, in preparing the lines. 417

Q. In charge of designing? The supervisor? A. That's right.

Q. You weren't a designer yourself? A. Not technically speaking, no, sir.

Q. And of course you are not a technical man in the sense of making any of these rings? A. No, sir.

Q. Your position is purely supervisory there? A. Right.

Q. Just what was your position in 1934? A. I was head designer, head of the designing department, which included the casting department.

418 *Plaintiff's Witness, Alfred E. Dixon, Cross*

Q. And your headship of the designing department gave you supervision over the men who made the drawings or original designs? A. That's right.

Q. And you didn't do that work yourself? A. No, sir.

The Court: Nor did you do any of the casting yourself?

The Witness: No, sir.

Q. How did you come to meet Mr. Jungersen in 1934?
419 A. Well, I was introduced after he had met Mr. Gregg and Mr. Ostby and Mr. Marchant.

Q. And Mr. who? A. Mr. Marchant, who was the sales manager at that time and, as I remember, I came in as an afterthought, you might say, or as part of the factory angle of the matter.

Q. Well, now, they had had an interview with Mr. Jungersen before you were introduced to him; is that right? A. It happened the same, at the same time; I mean within the space of a few hours, I should say.

Q. Yes. That is to say, they had had a few hours' talk with Mr. Jungersen and then you were brought in to meet Mr. Jungersen? A. As I remember.

420 Q. Now, did you on a subsequent occasion meet Mr. Jungersen? A. Yes, sir.

Q. When was that? A. I can't recollect, sir. It may have been 1935.

The Court: How long after the first meeting?

The Witness: About a year, I believe.

Q. Didn't you understand from Mr. Jungersen's disclosures on one or both of those occasions generally what his method was? A. I don't recollect that he described his method. He showed us rings, finished rings, and he may have—I can't recollect that he described any part of his method.

Q. Well, now, this second interview in 1935, were you called in again after there had been an interview between Mr. Jungersen and others? A. I believe so.

Q. And that had been a matter of some hours, too? A. It was some time.

The Court: What were you called in for after the discussion had been proceeding with the others? What was your particular function at this discussion?

The Witness: Well, it had to do with preparing lines, whether we could use that method in preparing our jewelry lines. 422

The Court: What method?

The Witness: His method of casting.

The Court: Had he described his method of casting?

The Witness: No, but he simply said he had a method. We were a stamping house.

Q. Who were the others whom you met on this second visit, this 1935 visit, before you were brought in after an interval? A. That is hard to remember. Presumably Mr. Ostby again, as he was superintendent of the factory at that time.

Q. Was there more than one Mr. Ostby? A. Yes, sir. There was Mr. Harold Ostby, who is president, and 423 Mr. Raymond Ostby, who is the superintendent of the factory.

The Court: Which Mr. Ostby were you referring to?

The Witness: Mr. Raymond, the superintendent.

Q. Well, who else that you recall as being present at that interview in 1935? A. I don't recall Mr. Gregg being at that meeting. He may have been, but my memory—it seems to me that it was Mr. Ostby and Mr. Marchant and myself.

Q. And so far as you know Jungersen had told them his method before you came? A. I don't admit that. I don't know what he told them.

424 *Plaintiff's Witness, Alfred E. Diron, Cross*

Q. Well, I say so far as you know—

The Court: Well, I mean, he said he doesn't know.

Q. Now, the articles of jewelry that you now make by your casting process are intricate to the extent at least of having one or more small projections or depressions, are they not?

Mr. Groner: We will admit that.

Mr. Cooper: All right.

425 Mr. Groner: In many cases.

Q. By the way, this process of Stein, how long did you see Stein around there? A. I believe he was there for two or three weeks. I may be a little off on my time, but it was a matter of several days.

Q. And only on one occasion? A. I think he returned to check up at one time later.

Q. Well, do you remember Mr. Jungersen being there after Mr. Stein came? A. I believe he did return.

Q. Did you tell Jungersen about having taken Stein's process? A. Not personally I didn't. I did not.

Q. Well, did anybody, to your knowledge? A. That I
426 can't vouch for.

Q. Well, as I understand your process that you say you got from Stein, you first produce a model of the article to be cast, don't you? That is done by your designer? A. That is done by hand.

Q. Then you form about the model a primary mould, don't you, this metal mould? A. That's right.

Q. Then you remove the model from the primary mould, don't you? A. That's right.

Q. Then you introduce into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould, molten wax or other

material of low fusing point that will not injure the primary mould? A. That's right.

Q. And you form a pattern that way? A. That's right.

Q. And from that pattern you make, by investing it as you have described and forcing molten gold into the cavity, the article to be made? A. That's right.

SAM TOUR, called and sworn on behalf of the plaintiff, testified as follows: 428

Direct Examination by Mr. Groner:

Q. What is your age and what is your residence, Mr. Tour? A. I am 50 years, live at 435 West 23rd Street, New York City.

Q. And what is your occupation? A. Consulting engineer.

Q. Are you connected with any concern? A. I am president of Sam Tour and Company, Incorporated, a firm of engineers, metallurgists and consultants.

Q. And are you a licensed, professional engineer in New York State? A. I am. 429

Q. Will you outline your career starting with any college degrees you may have received and coming up to the present. You may read if you—

Mr. Cooper: Oh, I will concede Mr. Tour's capacity.

The Court: Well, I would like to get a general idea of his background.

A. Degree of bachelor of science and chemical engineering, University of Colorado; master of science and engineering from the University of Michigan in 1917; 1917

430 *Plaintiff's Witness, Sam Tour, Direct*

to 1921 I was with the Ordnance Department of the U. S. Army as engineer of tests and metallurgist in charge of the Metallurgical Section, Technical Staff, Office of Chief of Ordnance, U. S. Army, Washington, D. C. From 1921 to 1928 I was metallurgist and engineer with the Doehler Die Casting Company.

Q. What is the Doehler Die Casting Company, if I may interrupt? A. The Doehler Die Casting Company is the largest die casting company in the world with plants in five different cities of the United States.

431 1928 to 1929 I was an independent consultant.

1929 I went with Lucius Pitkin, Inc., New York City, as vice president in charge of engineering.

Q. What is the business of Lucius Pitkin? A. Consulting metallurgists and chemical engineers, analytical and consulting chemists. I stayed with them until the organization of my own firm in 1943 with which firm I took over the engineering department of Lucius Pitkin, Inc.

1940 to 1943 I was director of the laboratory at Frankford Arsenal, Ordnance, in Philadelphia; and this past summer I was scientific consultant for the Foreign Economic Administration for technical, industrial and intelli-
432 gence survey of metallurgy in Germany for U. S. industries.

Q. Do you belong to any technical societies and have you written any articles relating to technical or scientific subjects? A. I am a member of the American Foundrymen's Association; Society of Automotive Engineers; American Institute of Chemical Engineers; American Institute of Mining and Metallurgical Engineers; American Society for Testing Metals; American Society for Metals; Association of Consulting Chemists and Chemical Engineers.

I have written a number of articles on varied sub-

jects including foundry practices, melting and casting of metals and treatment of metals.

Q. Now, you referred in your last answer to casting. Will you explain what casting is? A. Casting is a general term with reference to the art of filling a mould cavity with liquid material which when it hardens will assume the exact shape of a mould cavity.

Q. And there are different types of casting? A. There are many types of casting.

Q. Will you name some of the more commonly known and practiced? A. The most commonly known type of 434
casting is called sand casting. It is divided into two classes, green sand and dry sand casting.

Next I would say would be permanent metal casting in which metal is poured into a relatively permanent mould and there is die casting in which metal is forced into the parts of a metal mould under high pressure. There is vacuum casting in which the metal is sucked into the mould; there is slush casting in which the metal is poured in and quickly flushed out again; there is plaster of Paris casting, dental casting, centrifugal casting. There may be a couple of others.

Q. Are they all, you might say, tools in the caster's tool box? A. That's right. They are all common methods 435
used wherever they are particularly applicable.

Q. How long have these various systems of casting been broadly practiced, widely known? A. For generations.

The Court: Centrifugal?

The Witness: Yes, sir.

Q. Now, confining yourself to the casting field, will you outline your experience there, stating the nature and particular kind of casting with which you have personally had to do? A. I was first associated with sand casting and permanent metal casting and some centrifugal cast-

436 *Plaintiff's Witness, Sam Tour, Direct*

ing during World War I for the Ordnance Department. Then during the eight years with the Doehler Die Casting Company I was directly in the production end in connection with pressure die casting and in connection with plaster mould casting; during that period also some lost replica or lost wax process casting. Since then I have been connected with numerous installations on sand casting, centrifugal casting, dental casting, precision casting, jewelry casting; and during this war, of course, a considerable amount of what is called precision casting
437 in the lost replica process.

Q. What is your relationship with the plaintiff, Ostby and Barton Company? A. I have been consultant for Ostby and Barton on call since 1929.

Q. Have you been called in connection with any casting problems by them? A. Yes, sir, they have called me in connection with the casting process installed under their agreement with Mr. Stein.

Q. Is that in 1936? A. That was in 1936.

Q. And is that type of casting generally referred to today as precision casting? A. That is so.

Q. Are you familiar with the patent in suit? A. I am.

438 Q. By a reference to the patent in suit will you state to what it refers?

* * * * * * * * *

A. The opening sentence of the patent in suit states, "The principal object of this invention is to facilitate the casting of small metal articles, particularly articles of intricate detail such as jewelry." The last paragraph prior to the claim states, "It will be understood that this process is particularly applicable to the casting of precious metals, but it will also be understood that various other metals may be handled in the same way and particularly base metals of tin and similar alloys."

Now, a small copy of the chart that sits before you has been introduced here as Ostby and Barton Exhibit P-20. Are you familiar with that chart? A. I am.

* * * * * * *

Q. Will you state what that chart is? A. That chart is a comparison of the various steps of the Jungersen patent with corresponding steps in the prior art.

* * * * * * *

Q. You are familiar with those prior art references which are there epitomized? A. I am. 440

Q. Now, referring to the chart, will you describe briefly the system disclosed in the patent in suit, and for the purpose of the record may I say that when I speak broadly of the system I mean the sequence of basic steps, without going into detail as to the particular way of performing any steps? A. Well, in the patent in suit a model of the article is made. A mould is then formed around this article, and, of course, the article is then removed from the mould. The mould is then filled with low-fusing point material to make a pattern. The pattern is then removed, the pattern is invested, the pattern is then melted, burned out of the investment and casting is then made to fill the cavity left by burning out the pattern. 441

Q. Now, referring to the chart again, are there any differences in the system employed by the patent and the systems of the prior art references shown on the chart of which there are seven? A. There are no differences with the possible exception that in the Kralund method you can do away with an original model and build the original mould without a model.

Q. Is that characteristically done, that is as Kralund did? A. That is common practice in die casting to build dies, moulds from drawings of the parts to be made instead of from models. It is common to use models also.

Q. Does Kralund make any suggestion as to whether

442 *Plaintiff's Witness, Sam Tour, Direct*

you make your die from a model or drawing or does he just assume that you do either you want? A. He omits any mention of that.

Q. Now, you say there is no difference between the systems of the patent in suit and the systems of the prior art commencing with Cellini and running up through the Austenal prior uses; that is correct, is it not? A. That is correct.

Q. And you mean by that that each of those prior art references employs exactly the same basic steps in exactly
443 the same sequence as does the patent in suit?

Mr. Cooper: Wouldn't it be better to let the witness testify than put the words in his mouth?

The Court: Well, if that is his conclusion he may say so. It will save a lot of time. Is that your conclusion?

The Witness: That is so.

Q. Now, coming to detail differences, if any, will you explain whether there are differences, and if so what there are, between the system of the patent in suit and the prior art systems to which you have referred? A. Reading across the top, as to the purpose of each of the
444 systems, there is no specific difference; the purpose in each case is to produce a casting. Under the matter of the model, in each case a model is used, with the possible exception of Kralund, who does not mention a model, but where models are often used. In each other case a model is made. The mould is made from the model in the case of Cellini.

Q. And that is the paragraph designated B? Just so that we can follow you across. A. That is right, paragraph B. The model in the case of the Jungersen patent is used to form a mould of flexible-forming material. In the case of Cellini a multi-part mould of ceramic material is made. In the case of Spencer an elastic mould of

rubber is made. In the case of Hazeltine an elastic mould of rubber is made.

The Court: Well, there seemed to be two methods—one, the flexible, and the other the multi part; is that right?

The Witness: That is right.

The Court: Anything else referred to except those two methods in any of the various prior art processes?

The Witness: No, sir.

The Court: All right.

The Witness: It refers simply to two different materials for flexibility. 446

The Court: Take C, then.

A. (Continuing) Under C, under Jungersen, the wax is put in by centrifugal action. Under Cellini it is simply poured in. Under Spencer it is simply poured in. Under Hazeltine the wax is simply poured in. Under LaGravure again simply poured in. Under Kralund it is put in under pressure. Under Slatis-Dee it is put in under pressure, casting centrifugally. In the Austenal method it is put in under pressure, using an eye-dropper or syringe.

Q. Mr. Tour, you didn't mention the type of pressure employed by Kralund. I think it would make the record more complete if you did. A. Kralund uses die casting pressure obtained by operation of a plunger. In other words, plunger pressure. 447

Q. Now, then you come to paragraph D. A. Paragraph D, in Jungersen, the pattern so made is invested in plaster-of-paris like material. The same is true in Cellini. The same is true in Spencer, the same is true in Hazeltine; and in fact as we go down it is true all the way through. In each of them a plaster-of-paris like material is used to form the investment.

Q. Now will you refer to paragraph E, please? A. Paragraph E. In each case the material of the pattern

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is removed by melting and burning, in all of the methods uniformly.

Q. Now will you refer to the final paragraph? A. The final paragraph under Jungersen, the metal is put in, cast in, by centrifugal action. Cellini does not use pressure; he simply pours the metal in. Spencer makes no mention of how the metal is poured in; assumedly just simply poured in by gravity. Hazeltine puts the metal in under static pressure obtained from a standpipe, but he does use pressure. LaGravure pours the metal in and then applies
449 pressure, putting a wet blanket over the top of the metal and pressing it down to create steam pressure; so that LaGravure uses pressure, Kraland uses pressure, Slatis-Dee used centrifugal action, and Austenal used centrifugal action.

The Court: Slatis-Dee also refers to a compressed air machine. That's a pressure machine?

The Witness: That is right, your Honor. He used either centrifugal or compressed air machines. Both have been common in the dental industry for many years.

Q. Now, with relation to paragraph B on the chart, which describes and relates to the mould employed, you
450 have spoken of the two types of moulds shown in that column, to wit, the flexible mould and the multi-part inflexible mould made of metal or ceramic material. Are those different types mould interchangeably used for the same purpose? A. Yes, sir, they are.

Q. And how long has that been true, Mr. Tour? A. That has been true for hundreds of years.

* * * * * * *

Q. Mr. Tour, in your experience are such moulds used interchangeably? A. They are.

The Court: Well, is there any particular advantage in one over the other?

* * * * * * *

The Witness: Within the limits of each product desired. If the casting can be made with relatively low pressure and obtain the detail and accuracy, the flexible moulds are cheaper and easier to make. If the metal casting to be made or the casting to be made in the mould is going to take considerable pressure or must be very accurate in dimensions, then the flexible moulds are too yielding to permit of the high pressure, or give the accuracy required.

The Court: It is a question of pressure, is it?

The Witness: Mainly a question of pressure and accuracy. During this war it developed in our precision casting work that to make the very accurate small parts needed for radar instrument work and Signal Corps work, rubber moulds and any type of elastic mould just gave too much and it was necessary to use multi-part metal moulds in order to hold very accurate dimensions. 452

Q. Now, will you refer to the period of 1932, say, which I pick arbitrarily as a period prior to the time Mr. Jungersen came into this field? Can you state whether at that time flexible moulds, such as rubber moulds, were known? A. Yes, sir, they were known and had been known for many years.

Q. Can you give examples of such moulds, by reference to the chart, if you care to? A. The Spencer patent of 1904 describes flexible moulds. The Hazeltine patent of 1875. The LaGravure of 1926. The Slatis-Dee method of 1931, and the Austenal method of 1932-33, as shown on this chart; there are numerous other references through the literature to flexible and elastic moulds. 453

Q. Just to draw record attention to them, the Zampal patent included in Ostby & Barton's book, the British Anode patent, and the book "Die Casting Practice," are among those which additionally show the use of such moulds; is that correct? A. That is right.

Q. Are you familiar with the file history of the patent in suit, which is Jungersen's Exhibit D-14, or P-1? A. I am.

Q. Now I shall read you from page 42 of that file history, which is a part of the remarks made by the applicant in his amendment entered April 1, 1936:

"Spencer's resilient mould made of strips of rubber would bulge under the stresses set up by centrifugal force."

And again, "It is really an absurdity to even imagine
455 anyone whirling Spencer's rubber strip mould in a centrifugal machine in order to make a casting, whether of wax or metal."

I also read you from page 48, which is a part of applicant's remarks attached to the amendment of December 16, 1936:

"Applicant's solid rubber mould cannot bulge under the stresses imposed by the process," which means the process described in the Jungersen application which became the patent in suit.

Do you understand the references to Spencer's resilient mould? A. Yes, sir, I do.

456 Q. Can you identify what the applicant was there speaking about? A. Spencer's resilient mould is a rubber mould made around the model and then backed up with casing of * * * plaster-of-paris or a similar material to hold it together.

Q. Now, will you identify Spencer for us so that there is no question as to— A. Spencer is the third column in the chart, the Spencer patent of 1904, and the description of backing up the rubber mould with a casing is contained in paragraph C. It is further described in some detail in the patent itself.

Q. Now, are these statements which I have just read to you and which were made by the applicant during the

457

prosecution of his application in an attempt to secure his patent, in your opinion, sound or unsound? A. They are definitely unsound.

Q. Will you address yourself to the first two statements, that Spencer's mould would bulge and that it would be an absurdity to whirl Spencer's mould? A. Well, Spencer's mould being backed up with rigid castings could not possibly bulge and it would be very simple to use it for centrifugal casting purposes; in fact, the equivalent of the Spencer mould, being a rubber mould backed up with plaster-of-paris—

458

The Court: Well, it is the backing up that prevents the bulge?

The Witness: That is right.

The Court: When the centrifugal force is applied?

The Witness: That is right, and similar to that used by Slatis-Dee, as shown in the Slatis-Dee method of 1931.

Q. Did you witness the demonstration by Mr. Jungersen yesterday? A. I did.

Q. Did he use anything comparable to the plaster backings of Spencer and of Hazeltine and of Slatis in order to prevent bulging? A. Yes, sir, he used two metal plates and a spring clamp to hold the two portions of the rubber mould together, to prevent their bulging.

459

The Court: Well, could there be a bulging sidewise? Because, as I recall, those metal plates were above and below the rubber and the centrifugal force would be applied laterally and not vertically. Isn't that the fact?

The Witness: Well, your Honor, the centrifugal force results in a hydrostatic pressure inside, which is in all directions.

The Court: In all directions.

The Witness: So it would tend to push the two halves apart.

460 *Plaintiff's Witness, Sam Tour, Direct*

The Court: Wouldn't there be an additional pressure laterally on the rubber from the motion, aside from the internal pressure caused?

The Witness: That is right.

The Court: That is, there would be a pressure exerted equally in all directions.

The Witness: That is right; and that refers, I might say, to my previous statement, that in using rubber moulds, as fine accuracy is not obtainable as in multi-part metal moulds, because there is some give to the rubber.

461 The Court: Yes.

Q. Mr. Tour, you referred to the Slatis mould as illustrative of the backing of Haseltine and Spencer, and I hand you now Osby and Barton's Exhibit P-3, which is the Slatis mould formerly known as C-31, and ask if that is the mould to which you referred. A. It is.

Q. Will you undo that and show it to his Honor so he can understand the relationship between the rubber and the backing there? A. There is missing from this mould the center piece that he normally uses on the inside sometimes, this rolled up sheet of paper.

462 The Court: Leave that in there.

The Witness: This rubber mould is a rubber mould made around the metal. It is made in two sections, one the black forming the outside, and then the white—by outside I mean the outside of the ring.

The Court: Immediately outside the ring.

The Witness: Yes, sir; and the white really forming the inside of the ring, then slit so that after the wax casting is made the rubber can be opened up and the wax taken out. The entire rubber mould is backed up and held on all sides by a plaster of Paris cast, the wax being introduced through the gate at one end.

The Court: The aperture there, or gate. So that there is no part of the rubber which would not be supported except this core. Now, is there any support placed in there?

The Witness: Yes. Normally I think Slatis' testimony refers to rolling up a wad of paper or something in his center core, as I recall it in his detail.

Mr. Groner: With that testimony, I don't think that is correct.

Mr. Cooper: I don't think it is.

The Witness: Then I don't recall. 464

Mr. Groner: I don't think there is any explanation as to that work.

The Court: That would leave, wouldn't it, some part of this rubber which was not supported?

The Witness: That is right.

The Court: As it appears—

The Witness: As it is here.

The Court: —in this exhibit.

The Witness: Yes, sir.

Q. Now, referring again to a part of the quotation I read you a moment ago from applicant's remarks about his own massive solid rubber mould, by reference to the patent in suit do you find any description there of a massive solid rubber mould? A. No, sir. There is no indication in the patent in suit as to any limitations in the size of the mould, its thickness. The only indication is in the illustrations which show a two-piece mould with one half being thicker than the other half, but no explanation as to why. 465

Q. Now, with reference to the description in column one of the first page of the patent in suit of the mould making, can you state whether, if that disclosure is followed, it would be possible to secure a separatable two-part rubber mould or not? A. Yes, sir. If the description as given in the patent were followed verbatim, it

would be necessary to cut the rubber mould in half in order to get a two-part mould.

Q. Why would you have to cut the rubber mould in half? A. Because the entire mould is constructed to completely surround the model and it is vulcanized so as to cause flow during vulcanizing, which necessarily means pressure vulcanizing, which will cause all parts of the rubber mould to adhere to other parts, and there would be no split sections.

Q. That cutting was a part of the mould making of Spencer and Haseltine, was it not? A. That is right.

Q. On the basis of the disclosure of the patent in suit with relation to this mould, do you think you could make a rubber mould? A. Without referring to the description, verbal description of how to make the rubber mould, but from the drawings as to what the rubber mould is; if one wanted to finish, one with knowledge of rubber moulding would go ahead and make it.

Q. Now, you referred to the flexible mould of LaGravure. Is it the same kind of flexible moulds as those of Spencer and Haseltine? A. No. LaGravure is a flexible mould made from gelatine instead of from rubber.

Q. What is the difference between gelatine and rubber as substances with which to make flexible moulds? A. Difference in cost, and the difference in curing. Gelatine is cured, as rubber is cured, for hardening purposes. The net overall result of getting an elastic mould is the same. The gelatine mould does not last as long as the rubber mould does on repeated casting and it is not as impervious to water changes. It tends to dehydrate and change dimensions, dry out, but for the production of a reasonable number of duplicates, the gelatine mould is a very good mould and is used up to this date. I used it not so many years ago.

Q. And you used it for the same purpose that you might have used a rubber mould? A. That is right.

The Court: How many years ago?

The Witness: 1931, 1932, in order to reproduce some unicorns for display at the World's Fair in Chicago, unicorns on a building in New York. They wanted small models of platinum finish and gold finish to display in their booths at the World's Fair. I made twelve such reproductions by flexible gelatine moulds.

The Court: I only asked you one question, how many years ago, and you gave me a description of the World's Fair.

The Witness: Excuse me. 470

Q. Now, Mr. Tour, will you refer to the Spencer and the Haseltine patents to which you have referred before on the chart? Is there any limitation in those patents as to the size of the rubber moulds to be employed? A. In the Spencer patent there is reference to making the rubber thinner at the points where undercuts are excessive in order to make it easier to remove the model, but except for such precautionary remarks with regard to making it thinner, there are no limitations.

Q. Is there any limitation in Spencer with relation to size? Expressed differently, is Spencer limited to a large mould? A. No, sir. Spencer is not limited to a large mould. 471

Q. Mr. Tour, I ask you the same question with relation to the Haseltine patent. Is there any limitation there as to the size of the work or the size of the mould? A. There is no limitation.

Q. I believe you stated earlier that there was no limitation in those two patents with relation to the thickness or the thinness of the rubber mould. Is that a fact, Mr. Tour? That is, is my recollection correct, Mr. Tour? A. That is right.

472 *Plaintiff's Witness, Sam Tour, Direct*

Q. What do they say, if anything, about thickness or thinness and its desirability or undesirability? A. As I stated, they refer to the desirability of having thinner rubber at the place of very great undercutting to facilitate the removal of the pattern, of the wax casting from the inside. If the rubber is too thick it does not flex away easily enough to avoid damage to the wax.

Q. Now, referring to the multipart metal moulds which you have referred to before—you may have substantially covered this—is it possible with them to secure intricate
473 designs or undercuts? A. It is possible to secure either or both.

Q. Did Cellini understand how to do that? A. Cellini describes it in great detail with his multipart ceramic mould.

Q. And what has he produced? Have you any knowledge on that score?

The Court: I have.

Mr. Groner: I withdraw the question. I will accept your Honor's answer.

The Court: I have seen and admired Benvenuto's work and been amazed by it.

474 Mr. Groner: I think we all today are when we learn that just now we are coming back to what he did almost four hundred years ago.

The Court: I refer, of course, only to his activities in metal making.

Mr. Groner: I assume that there is no limitation, your Honor.

The Court: He was also expert in other fields.

Q. Mr. Tour, are you familiar with the British Jungersen patent number 449062, which corresponds with the patent in suit? A. Yes, sir; I am.

Mr. Groner: I read you from page 1, lines 38 and 50 of that patent. I may say parenthetically

that the immediately preceding part of the patent in substance admits that everything in the system, including the use of rubber moulds, is old except, according to Mr. Jungersen's claim, what we now come to.

He says, and I quote, "It has been found, however, that a distinctly true fusible model of the original detail can be produced by centrifugally casting the molten wax (or other material having a low fusing point) directly into a resilient mould structure which has been produced from the original pattern, and also that the intricate detail may be faithfully preserved if the final product be produced by second centrifugal casting operation in a mould obtained by investing the fusible model." 476

Q. What was the effect, Mr. Tour, of centrifugally casting the wax as suggested in Mr. Jungersen's patent? A. The effect was the application of force, a small amount of force, to cause it to flow a little better into the details.

Q. And what was the effect of centrifugally casting the metal to which he also refers? A. The effect of applying a still larger force to cause the metal to flow into intricate details. 477

Q. Was there any difference between the effects in those two cases? A. Well, in a given centrifugal machine the effect of centrifuging it depends on or is a function of the unit weight or density, the specific gravity, of the material. Wax being light material the pressure created for a given speed of rotation is small, whereas metal being a heavy material the pressure created is that much larger.

The Court: You would need less pressure for the wax, wouldn't you, than for the metal to fill the same interstices, the same spaces?

478 *Plaintiff's Witness, Sam Tour, Direct*

The Witness: Yes, wax can be made so very fluid that it fills the interstices very completely.

Q. Mr. Tour, before the recess we were considering the statement from Mr. Jungersen's British patent with reference to centrifugally casting wax and centrifugally casting the metal. Is there any difference in the effect of centrifugally casting the one and centrifugally casting the other? A. No, sir, there is not. There is a slight increase or a major increase in pressure to give finer de-
479 tail, whether it is wax or metal.

Q. Was the use of centrifugal force for this purpose new with Jungersen? A. It was not; it was common for years.

Q. Does the McManus patent illustrate its use? A. It does.

Q. Is its use illustrated in the book "Die Casting Practice" by Stern? A. It is.

Q. Do you also have an early article, early with relation to the filing date of the Jungersen patent, having to do with the die casting of aluminum, which refers to the effect of centrifugal casting? A. I do, an article by Mr. George Mortimer, published in 1926.

480 Q. Could you read from that article briefly that which bears on this subject-matter? A. On page 371 of Volume 35 of the Journal of the Institute of Metals, he states:

"Pressure castings may be thinner, more accurate, better finished and produced at a far greater rate from one mould than gravity castings."

The Court: Well, is that pressure applied centrifugally?

The Witness: Later, in what I will read, he applies it centrifugally. This first that I read is his general state-

ment. Then he reviews the methods of applying pressure, and on page 375 lists slush casting, gravity casting, centrifugal casting, cothias casting, and pressure casting; and on page 377, with regard to centrifugal casting he says:

"It was natural, therefore, that engineers should early turn their attention to some form of artificial pressure whereby the mould could be filled by force and soundness and clean definition seemingly assured. The simplest form of artificial pressure is that of centrifugal force."

482 Q. Thank you, sir.

* * * * * * *

Q. You referred to the McManus patent. A. Yes, sir.

Q. Can you state the basic disclosure of that patent? A. The basic disclosure of the patent is an electrically heated crucible for melting metal for centrifugal casting or other type of pressure casting.

Q. What is the date of that patent, by the way? A. May 29, 1923. He states here on column 1, after referring to various dental castings:

"It may be equally as well applied to the casting of jewelry, such as gold rings, small trinkets and so forth, 483 where models or other dies or moulds may be used to be filled by centrifugal casting methods."

Q. Now you referred several times to its use of centrifugal casting. Does it also make provision for other types of equivalent casting? A. Yes, sir; on page 2, bottom of column 1, he states:

"While I have in the present embodiment of my invention elected to use centrifugal force to transfer the fused material from the furnace into the mould, I do not limit myself entirely or to dependence upon centrifugal means to make this transfer. The same result could be

484 *Plaintiff's Witness, Sam Tour, Direct.*

accomplished, for example, by shocking the molten material into the mould, such as by releasing a spring attachment to the furnace."

Then he goes on—

The Court: Also by the vacuum method.

The Witness: And describes a vacuum method of sucking the casting material into the mould after it has been fused.

Q. Thank you. Now, may we return for just a moment
485 to consideration of the Cellini system, the Spencer system, the Hazeltine system, and that of LaGravure, to all of which you have referred. Do any of those refer to the casting of wax under pressure? A. Only Kralund; * * * the others do not.

* * * * * * *

Q. In the ordinary operation of any casting operation, involving any molten material of any nature, if you failed to secure good detail in your casting, what would you do? A. You would find some way of applying pressure to get the detail.

Q. Now, Mr. Tour, are you familiar with the Kralund
486 patent No. 1,238,789? A. I am.

Q. What does it disclose? A. It discloses the making of the wax or fusable metal pattern by pressure casting methods.

Q. You referred this morning to your experience with Doehler. I believe the Kralund patent shows on its face that it belongs to Doehler. Had you any knowledge of it at the time you were with Doehler? A. Yes, sir.

Q. And was it operated? A. It was operated there. I worked with Kralund in its operation.

Q. Now will you refer to the chart, Mr. Tour, step by step, and explain the system as taught by the Kralund

patent and at the same time contrast that system or compare it with the system of the Jungersen patent?

The Court: Well, haven't we been through all that?

Mr. Groner: Not so far as Kralund is concerned, your Honor.

The Court: I think we have; we have been through it enough, we have contrasted all of them, step by step.

Mr. Groner: Very well, sir.

Q. Is there any difference, Mr. Tour, with relation to 188
the accuracy of detail between Kralund's die or multipart metal mould and the primary rubber mould of the patent in suit? A. Yes, sir. The castings obtainable from Kralund's multipart metal mould are much more accurate.

The Court: But the difference is in the result and not in the mould, isn't it?

The Witness: Difference in the—

The Court: The results obtained.

The Witness: In the results of casting the wax. The wax castings or crucible metal castings are much closer to dimensions and much more uniform—

The Court: In the Kralund. 189

The Witness: —piece to piece from the Kralund multipart metal mould than from a rubber mould.

Q. There has been some indication that the defendants—

The Court: Let me interrupt just a moment. It makes no difference what the size of the thing to be cast is, large or small?

The Witness: No, sir.

The Court: Your answer would apply equally to whether the casting is to be a large one or a casting of a small piece of jewelry?

The Witness: That is right.

490 *Plaintiff's Witness, Sam Tour, Direct*

Q. Have you had definite and direct experience within the last couple of years, Mr. Tour, with any system of precision casting of war instrument parts which essentially involve the use of Kralund? A. Yes, sir. Considerable.

Q. Now, I started to ask a moment ago whether jewelry casting is a separate art in itself. A. No, sir. Jewelry casting is just part of the casting art. It makes no difference whether you are casting jewelry, statuary, dental or industrial castings.

491 . . . . . .

Q. Now, can you refer to the LaGravure article which concerns itself primarily with the casting of sculpture and tell me whether it contains any illustration of the overlapping of these subfields? A. Yes, it does.

Q. Would you mind reading from that publication or its translation? A. The first sentence of the next to the last paragraph on page 5 of the translation reads "In 'lost wax' casting, the model, exactly inclosed in sand and with a master-jet easily disengaged, is then destroyed by heat: the wax melts, flows and leaves a cavity into which the metal flows directly, but for small pieces of jewelry, it is rarely that the sharpness of the
492 wax is retained; the pressure of the sand diminishing the clarity and the model is at the mercy of awkwardness or an accident. It is then preferable to cast the piece in gelatine, to take several proofs of it in wax and to go on with the casting in the following manner." Then he describes the investment lost wax processes.

Q. And the system which he then describes is the system which is epitomized on the chart, is it not? A. That is right.

Q. And that is the system, he says, applicable to the casting not only of sculpture but of jewelry? A. That is right.

. . . . . .

Q. Are you familiar with the Austenal and Slatis-Dee prior uses? A. Yes, sir.

Q. And you also described them this morning, did you not? A. That is right.

Q. Both of those prior uses involved the use of pressure in both casting operations, did it not? A. They did.

Q. Now, Mr. Tour, will you make reference again to the chart? I am going to read, step by step, from claim 2 of the patent in suit. As I go through each step I should appreciate your pointing out analogy or difference between the requirements of the claim and the practice of the particular prior art. 494

Mr. Cooper: Your Honor will recall that I am insisting that claim 2 is not before the Court.

The Court: Well, there are two aspects of this case. One is the application for declaratory judgment and the other is for the infringement. Now, you may conceive that there is no infringement of certain claims but as I gather, Mr. Groner would like to cover the whole situation. Is that the fact?

Mr. Groner: That is exactly it.

Mr. Cooper: So that your Honor is not passing on that point at this time? 495

The Court: I am hearing the whole thing.

Q. I read from claim 2 of the patent in suit: Method of casting jewelry and so forth "consisting in, first making a model of the article desired to be cast." What do you find as to that step with relation to the prior art shown on the chart? A. That is common to all shown with the exception of Kralund who does not refer to primary model.

Q. Now, I come to the second step: "Then forming a primary mould in separable sections there around of plastic material capable of assuming intimate contact with the

496 intricate designs of the model and adapted to retain the assumed shape." What do you find with relation to that step in the prior art? A. The answer must be qualified with the definition of plastic material. Plastic is defined as being necessary to multi-part movable parts.

The Court: Plastic doesn't mean that.

Mr. Groner: Your Honor please, plastic appears in the claim but not in the specification.

The Court: But you see he is saying that plastic means so and so and it patently doesn't; does it?

497 The Witness: In all these patents plaster of Paris is referred to as plastic material, yet it is a Cellini ceramic and after it is set—

The Court: Would you call metal a plastic material?

The Witness: Soft metal is called plastic and hard metal is normally not considered plastic; yet as I say plaster of Paris is not considered plastic either, yet it is referred to in all this patent literature as plastic material.

Q. Is rubber plastic, Mr. Tour?

The Court: Suppose you let me determine that.

498 Go on to your next point.

Q. Can you make an answer to the comparison of the step?

The Court: I have asked you to let me determine that. I will take his opinion with the limitation that he does not—or that it is not a plastic except by reference to the fact that sometimes it is accepted in one way and sometimes in the other. That is a fact?

The Witness: It is, yes.

Mr. Groner: Is it in order to state on the record that in view of the disclosure of the patent it would seem to mean elastic?

The Court: Well, he says it depends on the definition. Now if he is going to qualify it I will do the qualifying part myself. Proceed with the next step.

Q. The third step of claim 2, Mr. Tour, is "Then removing the model." * * * A. You are talking about the model as built and Kralund mentions no model to build his die; so that is common to all except Kralund. He may not have used a model to build his die. 500

Q. The next step, Mr. Tour, is, "Then by centrifugal force projecting into the mould cavity and completely filling same a molten material of a low fusing point which will not injure the mould." How does that compare with the showings of the prior art? A. The projecting of the fusible material indicating the use of pressure is shown in Kralund, Slatis-Dee and Austenal methods on the chart.

Q. The claim goes on: "Then investing said pattern in a refractory material which will assume all the contours of its intricate design to form a secondary mould." A. That is common to each and every one of the seven methods shown on the chart.

Q. The next step: "Then heat treating said investment removing the low fusing pattern therefrom." A. That is common to each and every one on the chart. 501

Q. Finally, "Then by centrifugal force projecting molten metal into the heat treated mould." A. The use of centrifugal force is common to Slatis-Dee and Austenal; the use of the equivalent in the form of other methods of applying pressure is shown in Kralund, LaGravure and Haseltine, and no mention of pressure in the remaining two.

Q. I was incorrect in saying that was the final thing. I now read it: "Finally removing said mould from the cast article." A. That is common to all the methods.

502 *Plaintiff's Witness, Sam Tour, Cross*

Q. Now I shall refer to claim 5 which is quite different in its phraseology and read it to you in the same way, and I should like you to make the same comparison. Claim 5 reads: "A method of casting an article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions." And I come now to the first step: "First producing a model of the article to be cast." A. That is common to all of the methods shown on the chart with the exception of Kralund.

503 Q. The second step: "Then forming about said model a primary mould." A. That is common to all of the methods shown on the chart with the exception of Kralund.

Q. The third step: "Then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould molten wax or other material of low fusing point that will not injure the primary mould to form a pattern." A. That is common to all of the methods shown on the chart.

Q. Finally, "And employing the patterns so made for the manufacture of a casting mould." A. That is common to all of the methods shown on the chart.

504 Q. Then, to summarize with relation to that fifth claim, with the exception of Kralund who does not specifically mention an original pattern according to your testimony, every step of claim 5 is shown in every one of the references in the chart; is that not correct? A. That is correct.

Cross Examination by Mr. Cooper:

Q. Who is the author of this exhibit P-20, this chart: did you get it up? A. I did not.

Q. Who did? A. I think it was prepared in Mr. Groner's office.

505

Q. How long ago did you know enough to use tale in vulcanizing rubber between surfaces that you did not want to have amalgamated, tale or some substitute for tale? A. Thirty years.

Q. Now, as I understood your testimony, and please correct me if I am wrong, you said that Ostby & Barton called you into the Stein situation in 1936. That was correct, was it not? A. That is correct.

Q. And they explained fully to you the Stein process at that time? A. No, sir, they did not explain the procedure in making the multi-part metal die; only the balance of the procedure from there on.

506

Q. Well, do you know whether Stein was responsible for the procedure in making a multi-part die, a metal die? A. That is pure hearsay on my part. They told me of Stein. I had never met the man.

Q. Well, at any rate, you understood the Stein process, from what they told you in 1936. A. That is right.

Q. Did they call your attention to their agreement with Stein which is in evidence here as P-22 and which contains as its last paragraph, "It is agreed that this information shall be kept within the company and no person not in the employ of Ostby & Barton Company shall be instructed in the process"? Do you remember if they told you about that? A. They told me nothing about that. The fact is I was in the employ of Ostby & Barton as consultant.

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Q. You were not in their regular employ; you just went in there? A. I had been going there regularly as their regular consultant then for seven years.

Q. And after you got this Stein—

The Court: You wouldn't consider yourself, in the ordinary sense of the term, an employee of Ostby & Barton?

The Witness: We consider ourselves as consultant in a factory—

Plaintiff's Witness, Sam Tour, Cross

The Court: You are retained to be called on, aren't you?

The Witness: As a part time employee, when we are there.

The Court: But you are retained so that you may be called in at any time.

The Witness: That is right.

The Court: You are not continually there.

The Witness: Not continually there, no, sir.

The Court: All right.

Q. Well, you went out with this process and introduced it to other people, didn't you? A. No, sir, I did not.

Q. Well, haven't you introduced a process of casting jewelry? A. I have shown people how to cast jewelry, yes, sir.

Q. And what was the difference between your showing them how to cast it and this Ostby & Barton process? A. Relatively little difference. They are all substantially the Kralund process with which I have had so many years' experience.

Q. Well, never mind about the Kralund process. I am interested in your showing to other people this jewelry process. Did you receive pay from other people for disclosing it? A. This is not a jewelry process. The process which I know of—

The Court: Well, don't let's quibble. Did you show it to jewelry houses?

The Witness: As a consultant I have shown and helped other people in making jewelry castings.

The Court: Consultant for whom? Consultant for whom?

The Witness: For other jewelers.

The Court: Other jewelers.

Q. And did you receive pay for it? A. Yes, sir.

Q. At what rate? A. My usual rates.

Q. What is that?

The Court: Well, I don't think

A. $100 a day.

Q. And to how many other jewelry houses have you disclosed this process? A. Oh, that would be difficult to say. I have probably assisted a half a dozen.

Q. Far more than that, isn't it? A. No, sir.

Q. You or your partner? A. I have no partner.

Q. Well, you or your employee. Haven't you or your employees disclosed this jewelry process to far more than half a dozen clients? A. Jewelers? No, sir. 512

Q. Well, I took you on your direct examination as saying that you instructed in numerous installations for jewelry casting and precision casting. A. That is right. Precision casting is the large war-time application, and in these past few years there have been numerous people in that field.

Q. And your testimony is that there have only been a half a dozen jewelry concerns to which you have imparted this jewelry process? A. To which I have been consultant. I would not say even in those cases imparted the jewelry process. I have acted as consultant in helping them eliminate some of the difficulties in the 513 processes as they operated them.

Q. Is there a Mr. Valley, V-a-l-l-e-y, connected with your organization? A. There was at one time.

Q. Did he instruct jewelry houses in this? A. No, sir.

Q. What— A. No, sir, he did not.

Q. Did you help select the particular patents that are in this chart, P-20?

The Court: That's this collection of English and American patents?

Mr. Cooper: Yes, the chart.

A. No. As I stated I had no hand in the preparation of the chart. Some of the patents that were included in the chart may have been some of the patents that I located in the first place. That I don't recall.

Q. Well, that isn't exactly the point of my question, which was—

The Court: Did you prepare, or did you help prepare this? Is this the one you mean, that collection of patents (indicating)?

Mr. Cooper: No; I wasn't coming to the collection just at the moment.

The Witness: He was referring to this chart.

Mr. Cooper: But to the chart.—

Q. Whether you picked out the patents that went on the chart. A. No, sir, I did not.

Q. Well, which of those, which of all the patents and publications before you do you regard as the closest approximation to the jewelry art casting process of Jungersen? A. All of these methods are the equivalent of Jungersen.

Q. That isn't what I asked you. I asked you which you regarded as the closest approximation—

Mr. Groner: May it please your Honor, there is no reason that I can think of why Ostby & Barton, or its witness, should be required to pick between things which basically are alike and which basically are equally good. Some possess one virtue and some another.

The Court: He hasn't testified on his direct examination that any one of them more nearly resembled the Jungersen than any other; and in giving his expert testimony he is subject to cross examination only on what he testified to, and you may not make him your witness for expert testimony.

Q. Now, what this chart, Exhibit 20, is, is in part a series of quotations and in part a series of statements about the patent in suit and about each member of the prior art, isn't that correct? A. That is practically entirely a series of quotations. The statements on it are simply explanatory to explain where something is lacking or missing, such as in the Kralund where the explanation is added that the original model is not referred to or where some large paragraph in a patent is boiled down, but it is substantially entirely quotations from the cited references.

518

Q. Have you yourself read the depositions about Slatis Dr. and Austenal? A. Yes, sir.

Q. Now you have said, as I understood you, that the Slatis produces the same results as the patent in suit. Is that the effect of your testimony? A. That is right.

Q. How do you account for the discrepancies between the original pattern and the casting that have been shown here in the photographs of Slatis? A. (No answer.)

Mr. Cooper, Jr.: Defendant's Exhibits 4, 5 and 6. (Photographs produced by the clerk.)

519

Q. Well, take, for example, D-4, which shows three objects, C-21, C-22 and C-23, as to which C-23 is the model and C-22 is a casting unfinished and C-21 is a casting that has been finished by handiwork afterwards. If C-21 was made from C-23 by the process here involved, how do you account for the discrepancies between C-21 and C-23? A. Will you point out the discrepancies you have reference to?

The Court: Well, the dullness, the lack of definition of the design. It is perfectly apparent.

A. Well, C-21, so far as I know, has not been polished; therefore it would naturally appear dull, as all castings

do. There are evidences in the C-21 of a number of protuberances on the pad below the stone setting, which may be a break in the mould in firing, may be any one, or result from any one, of a number of different defects in making a casting. In any event, a casting is purely the result of the technique of the caster in making the mould.

The Court: Well, assuming that C-21 is made from C-23 by this process, is that a good reproduction?

The Witness: No, sir, I do not say that C-21 is a good reproduction. It isn't a good reproduction of C-23. But I am trying to point out that it is not a question of the basic process used, but it is a question of the technique of the man in carrying out the process and all the many things that can happen through the process to give defective castings.

Q. Well, take C-5 and C-2, which are embodied in the exhibit D 5. There C-5, or C-2, is the model, and C-5 is the casting from C-2. Do you not see discrepancies between those two? A. I see no major discrepancies. I see numerous little globules.

The Court: Would you say that is a good reproduction?

The Witness: No, sir, that is a poor casting from the model, and the principal points of difference are the innumerable bubbles that were on the surface in the investment, giving all of the pimples in the casting. It is evident that some of the engraving marks on the original model, the hand tool marks, are reproduced on the finished casting, although they are marred with bubbles.

The Court: Would you say that the sharpness of definition on C-5 equals that of C-2?

The Witness: No, sir, it does not.

Q. Well, you have given all the explanation you can now of the discrepancies between

The Court: No, I think I interrupted his explanation of them. I just wanted to get clear in my mind my questions. Now what would be your explanation of the discrepancies?

The Witness: The sharpness of definition is first a function of the sharpness of the wax first made. Defective wax is made regularly when all the wax does not fill out normally, it would be set aside, thrown away.

The Court: Well, would you say that the results shown 524
in these two photographs which have been shown to you have been attributable to the cause you just gave?

The Witness: I could not say whether—

The Court: All right. Well, tell us what your opinion is so far as these are concerned.

The Witness: I could not say whether in C-21 the defect was on the wax or the defect occurred in making the casting after the wax had been melted out. In the technique of melting out waxes, if the wax is melted out too rapidly or if the mould—

The Court: It is a comparatively simple process, isn't it?

The Witness: It is comparatively simple, yet it does 525
introduce many of the faults of the process, and a considerable percentage of the spoilage of final casting results from the way the wax is melted out. If it is heated too rapidly the wax tends to expand and chip off pieces of the plaster inside the mould.

Q. Well, do you see any evidences of the chipping off of wax on C-21? A. I referred to chipping off of the plaster—

The Court: Well, chipping off—can you see any results of that in the mould?

526 *Plaintiff's Witness, Sam Tour, Cross*

The Witness: What this photograph shows

The Court: C-21.

The Witness: What this photograph shows here on the pad below the prongs would appear to be a mass on what should have been a flat pad, and if that is what was on the article photographed, then that could well have come from a piece of plaster having chipped out of the mould before making the casting.

Q. Well, how do you account for the obvious differences between C-21 and C-22, both of which are castings un-
527 finished from the model of C-23? A. In the case of C-21 a portion of the side is missing, which is something that may have happened due to the molten metal not fully filling the mould. In other words, the molten metal could have been too cold.

Mr. Groner: Excuse me.

The Court: You mean C-21 or C-22?

The Witness: C-22.

The Court: C-22.

A. (Continuing) There is a ridge around the side of the pad missing. That is what happens when metal is cast too cold. It doesn't fill the mould. Those are cast-
528 ing defects. And that may be the explanation, and has no reference to whether that part was missing in the wax or not. One cannot say by looking at a finished casting of this type whether the wax was defective or whether the defect occurred in making the final casting.

The Court: Well, if you had two castings made from the same form, wouldn't you be able to give a pretty good idea then of what was missing?

The Witness: If made in the same metal in the same flask at the same time, like this cluster that was seen, then it is more proper to compare them. It is my understanding that C-22 is platinum and C-21 is gold. They are entirely different metals, in this case.

Q. Well, have you examined all this series of models that have been produced to represent Slatis—have you examined them all critically? A. Not critically, no, sir. I have looked at them all, but I have made no critical examination of piece by piece.

Q. Well, now if it should turn out, as we expect to show, have shown in part and expect to show in full, that they are the same character of discrepancies between models—I mean between castings—from the same model as are here in these two I have shown you, what would be your explanation as to that? Could it not be that in fact the results were not made according to the process that is here involved at all? A. No, sir.

Q. Why not? A. Because primarily in all of these castings, the defects in the final casting are a function of the metallurgical technique in melting and casting the final casting and not the technique of making the wax pattern.

Q. Well, but if you find over a whole series of articles that are said to have been cast by a certain process in a certain way the same discrepancies between model and alleged castings, is it not possible that the alleged castings were not made by the process but were formed in some other way and touched up afterward? A. I wouldn't know what discrepancies you are referring to. If you are referring to discrepancies as illustrated on the two photographs that you have asked me to examine, my reply is that those are all discrepancies within the variations in the art of casting metals.

Q. Well, how do you account for the fact that there are no such discrepancies in the results produced by the Jungersen patent here? A. I haven't stated that.

Mr. Groner: Excuse me.

Mr. Cooper: I am putting it, your Honor.

The Court: Yes, I know, but you are presuming something that has not been established. If it were

true that none of the castings made by the Junger sen process were ever blurred, all right, but you are presuming that is so.

Mr. Cooper: Well, to the extent that they have been produced here, there is no blurring, if your Honor please. We have produced a considerable number.

The Court: I know, but this gentleman says that the defects which have been indicated in the photograph may have been the result of bad metallurgical processes. Is that right?

The Witness: That is right, sir.

Q. And so far as you know they may have been the result of something else, mayn't they? A. Oh, they might well be the result of a lot of things.

Q. How large were the gelatine moulds that you used many years ago in 1931 and 1932 for making unicorns for the World's Fair? A. Approximately twenty-four inches long.

Q. Have you used the same sort of gelatine since in casting? A. Yes. I think I used it once since in an experiment in the laboratory on another job.

Q. In the laboratory. Not a commercial job? A. That is right.

Q. Well, now, there is one thing I am puzzled about your testimony on, and I will put my question this way. Given the same centrifugal force, which is greater? Its effect on metal or on wax? A. Given the same centrifugal force?

Q. Yes. A. I don't recall such a question.

Q. Well, I am putting the question to you. A. Oh. Given the same centrifugal force, the force results in a hydrostatic pressure which would be the same magnitude of pressure irrespective of the material involved.

Q. But I asked you which.

The Court: Which would it affect more quickly? The wax in a liquid state or metal in a liquid state? I think what the question is directed to is: Suppose you have wax to be driven into a mould and you apply a certain amount of centrifugal force to it, the wax being heated and fluid. Then contrast that with the effect of the same amount of centrifugal force on a metal which is to be applied to a similar type of mould. Where would you get the best penetration with the wax or with the metal, or would there be any difference at all? 535

The Witness: I would say that with the same amount of centrifugal force, which I will have to define, you would get greater penetration, greater detail with wax than with metal, but— 536

Q. That is because the wax—

The Court: Wait a minute. Wait a minute.

The Witness: But to obtain the same amount of centrifugal force with wax you would have to spin about five times more rapidly than with metal because wax is so much lighter; but spinning at the same speed—

The Court: Well, spinning at the same speed with the arm the same length, which would get the greater penetration? 537

The Witness: There would be very little difference.

Q. What were the names of the half-dozen concerns to which you referred as having introduced the jewelry casting process? A. I think I qualified that as not having introduced it.

The Court: No. He said he was called in as a consultant to take out some of the bugs in the systems they already had installed. Is that right?

The Witness: That is right.

538 *Plaintiff's Witness, Sam Tour, Re-direct*

Q. What were they? A. I don't know as I recall all of them. J. R. Wood was one.

The Court: What process did he use? The Stein process or what?

The Witness: Jungersen.

The Court: Jungersen?

The Witness: He is one of the Jungersen licensees. Katz and Ogush is another. Some years ago I was called in to B. F. Hirsch. At the moment I don't recall the others.

539 Mr. Cooper: All right.

Re-direct Examination by Mr. Groner:

Q. Will you contrast, Mr. Tour, the method employed by Ostby and Barton and that of the Kralund patent?

Mr. Cooper: Well, I will object to that. That is not proper re-direct. I did not ask any questions leading to that.

Mr. Groner: I beg your pardon. If it please your Honor, it is only re-direct—

The Court: What was the question, please?

540 (The last question is read.)

Mr. Groner: Counsel for Mr. Jungersen first asked the witness as to whether he had learned anything from Ostby and Barton under an injunction of secrecy and whether he had not then sold it to others.

The Court: No. He testified that he did not at any time instruct anybody, that all he could do was go in as a consulting engineer. So we don't have to go into that.

Q. Now, Mr. Tour, I hand you the photograph, Jurgersen Exhibit D-4, about which you testified on cross examination, and I also hand you Ostby and Barton Exhibit P-6, which contains the rings formerly known as C-21, C-22 and C-23, which are represented on that photograph. Will you take those rings and will you show them, incidentally, to his Honor, and then will you state whether they could have been made from the model C-23 by the cuttlefish method, for example? A. These rings are impossible of production, reproduction, by the cuttlefish method.

542

Q. Do you know of any method other than those represented on the chart, Ostby and Barton Exhibit P-20, by which they could be made, and when I say that I include in that variants shown on that chart? A. No, sir, they could not.

Mr. Groner: That is all, your Honor.

Re-cross Examination by Mr. Cooper:

Q. That includes, does it not, all your knowledge of the prior art in your last answer?

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The Court: Well, he doesn't know any at all: so it must include everything he knows.

Mr. Cooper: All right.

Mr. Groner: Now, may it please your Honor, the testimony up to now has not adverted at all to the issue of infringement. That issue is restricted by my brother's admission to Claims 5 and 6 of the patent in suit. There is no question but that if the words of Claims 5 and 6 may be read literally, there is infringement by the operation of the defendant of both Claims 5 and 6 exactly as Cellini in the 16th Century would have infringed. I shall submit that there are file wrapper estoppels

by which Mr. Jungersen has precluded himself from claiming a construction of the words in those claims broad enough to cover our operation or our article. I don't believe, if we are going to have briefs and arguments after this hearing, that it will be necessary to do anything with relation to that phase of the matter. I don't think it requires any testimony at all, and I think it would waste your Honor's time, and if we may have an understanding to that effect, the plaintiff now rests.

545 Ostby and Barton now rests.

Mr. Cooper: An understanding with me?

Mr. Groner: Understanding that the question of file wrapper estoppel may be developed in briefs.

Mr. Cooper: That is for the Court to say.

Mr. Groner: That is just what I asked, Mr. Cooper.

The Court: I am perfectly willing to permit that to be performed in briefs unless you can see some point that would be unfair to you, Mr. Cooper.

Mr. Cooper: No, I think not. I think it is a

546 matter of argumentation pure and simple.

The Court: And have you any rebuttal?

Mr. Cooper: A very little rebuttal. I want to put Mr. Shaw on the witness stand for a moment or two.

The Court: All right.

GEORGE SHAW, recalled on behalf of the defendant, in rebuttal, testified as follows:

Direct Examination by Mr. Cooper:

Q. I want to ask you first, Mr. Shaw, have you produced a considerable number of rings made according to the Jungersen process under your direction as samples or examples of what can be done? A. Yes, sir. All the rings here are made in the Jungersen process under my direction in my plant.

The Court: All these were made under your supervision in your plant by the Jungersen method? 548

The Witness: Yes.

Q. Well now, are they all but two or three patterns, or can you select them out by patterns or something? A. I can select them out as they are in the pattern. Shall I order them? At this instant here we show the finished ring besides the cast ring. The same here. I might state—

The Court: You are not leaving any diamonds here, are you?

The Witness: No, sir. I might state that those rings are taken from our regular stock castings. We take orders from stock castings and those castings are taken 549 from the regular stock castings.

Q. Now, let me just get this in order. These are all— A. From the same mould.

Q. Castings from the same mould? A. Same mould.

Q. And they show identity between successive samples cast from the same mould? A. Yes, sir. I am not a metallurgist or an expert. I am a jewelry mechanic. I will say the uniformity in those rings is undeniable. We have nothing else but uniformity. If the mould is filled, we have uniformity. If the mould is partially filled,

550 *Defendant's Witness, George Shaw, Direct.*

we still have the sharpness of uniformity in the piece that is filled.

Mr. Cooper: Now let me deal with these. I would like to offer as one exhibit this bunch of models.

Mr. Groner: No objection.

(Received and marked Exhibit D-17.)

Q. Now, this is another set of identical castings from a single mould, is it? A. Correct.

551 Mr. Cooper: I will offer that in evidence by the next number.

The Court: Tie them together.

(Received and marked Exhibit D-18.)

Q. And here is still another set of identical castings from the same mould? A. That is correct.

Q. Now with respect to all these three sets that I have introduced has anything been done to the castings after they came out of the mould? A. No, sir. They are just as they are removed from the mould and cleaned by an acid pickle.

The Court: Except this—you took that out.

552 The Witness: Yes, I took that out.

Mr. Cooper: I am coming to those in just a moment but I will offer in evidence those three sets of identical ones.

(Received and marked Exhibit D-19.)

Q. Is this still another pattern? A. Yes.

Mr. Cooper: Well, I don't think it is necessary to get all—

The Court: No, I think three are enough.

Q. Now, we come to these two pieces here; what are they? A. One is a casting that is removed from the

mould. The other is a finished product made from the casting from the same material.

Q. The brighter one of the two is the finished product? A. Yes.

The Court: What is the difference between the casting as it comes from the mould and the finished product?

The Witness: Fifteen minutes of polishing.

The Court: Well, is there any difference in sharpness of definition or accuracy?

The Witness: There is a slight difference in size, your Honor, but little or no loss in accuracy or sharpness. 554

Q. That is, there would be a tendency to some loss of accuracy or sharpness in polishing? A. That's right.

Q. And the only thing that has been done has been the removing of the sprue besides the polishing? A. And a certain fifteen minutes of bench work.

The Court: What?

Q. What, bench work? A. Principally sandpapering and cleaning, where the small openings are frayed and the shank sandpapered; the ring is cleaned on the inside, brazed and stamped, an operation involving about fifteen minutes.

555

Mr. Cooper: I offer in evidence these two.

Mr. Groner: No objection.

(Received and marked Exhibit D-20.)

Q. Now this pair here is the same as the last pair—I mean your answer would be the same? A. Same inasmuch as it is a different style of ring.

The Court: Different style of ring but the same conditions exist.

Q. And the same procedure? A. Yes.

556 *Defendant's Witness, George Shaw, Direct*

Mr. Cooper: I will offer in evidence that—

The Court: Finished product.

Q. On this finished product here is there any bench work? A. The bench work is less in this instance as the design is simpler—possibly a matter of five minutes.

Mr. Cooper: I will offer in evidence that pair.

(Received and marked Exhibit D-21.)

Q. I just want to identify a cuttlefish mould here. That is a cuttlefish mould? A. That is correct.

557 Q. Now, will you explain that to the Court just what you do with that? A. The mould is obtained by using a complete shell of the cuttlefish. The general shape is as you see, twice the size of the half into which the model is pressed and a gate or sprue is cut.

The Court: The model is compressed—

The Witness: Into one-half; the other half is applied on top and they are compressed together?

The Court: But you get—

The Witness: The model is removed—

The Court: Wait a minute. You get the cuttlefish bone.

558 The Witness: Yes.

The Court: How do these indentations come in the cuttlefish bone?

The Witness: The cuttlefish bone is rubbed flat on a sandpaper or marble slab. The model is placed on one-half, the burner inserted, the other half placed on top and the whole model compressed.

The Court: Model of what?

The Witness: The ring to be cast.

The Court: What are all these burnings?

The Witness: Well this occurs when the model is removed. A sprue or opening is cut, the gold pours in and this is the burning which takes place around the article.

By Mr. Cooper:

Q. That is to say the same cuttlefish bone model is used for casting material as for—

The Court: To the model is connected something which creates a hole.

The Witness: No, in this general type of casting it was quite the usual practice to cut that with a knife. It is just a very simple scoop with a knife so that you would permit the metal to be poured in there.

Mr. Cooper: This is the form of casting. 560

The Court: Removed from the mould. All right.

The Witness: This is also a casting of the same type.

Mr. Cooper: I will offer in evidence the cuttlefish mould.

(Received and marked Exhibit D-22.)

Q. This is one like we cast in court from that same mould? A. Yes.

The Court: Well, you have got enough.

Mr. Cooper: Yes, I think so.

Q. Well, now, this box is— A. Waxes of various types of pieces of jewelry made from moulds. 561

The Court: We have the general idea and the wax that was introduced and made right here, unless you want to introduce it for the purpose of showing the intricacy.

Mr. Cooper: I think I should like to do that.

The Court: All right. I see something there that are not rings.

Mr. Copper: I will offer this box of wax models that will be—

The Clerk: D-23.

(Received and marked Exhibit D-23.)

562 *Defendant's Witness, George Shaw, Cross*

Q. That represents models actually cast by this Jungersen process at your plant? A. With the exception of two.

The Court: Take the two out.

The Witness: I might state, your Honor, that these waxes are created from the mould by a girl who operates a centrifugal casting machine with a production from three to five hundred waxes a day, in Canada, of course, I am speaking of my own country.

563 The Court: Well, a wonderful country they tell me. That's all I care to hear about it at the moment.

Q. That's all.

Cross Examination by Mr. Groner:

Q. You testified yesterday, Mr. Shaw, that you had never read the Jungersen patent, did you not? A. That is correct.

Q. So when you speak of the Jungersen process you speak of what Mr. Jungersen or someone else taught you? A. Right.

Q. That's all. A. The Goldsmith Company as a mat-
564 ter of fact.

The Court: All right.

Mr. Cooper, Jr.: Just an offer of some documentary evidence, your Honor, and I think we are through. I would like to offer in evidence original license agreement with Krementz and Company to which was attached the original addenda enabling Jones and Woodland Company to operate as a licensee, Jones and Woodland Company being one of the firms listed by Mr. Gregg on his examination.

The Court: Any objection?

Mr. Groner: None at all. We concede that to be the fact.

Mr. Cooper, Jr.: Your Honor, I offer in evidence photograph of exhibits, rings identified as C-14, 15 and 38 which rings are in evidence as P-5.

The Court: Well, what are they?

Mr. Cooper, Jr.: Well, they are similar photographs, enlargements in order for your Honor—

The Court: Enlargements of rings already in 566
evidence?

Mr. Cooper, Jr.: Yes, sir.

The Court: All right, just so they will be identified, that's all.

(Photograph received and marked Exhibit D-29.)

Mr. Cooper, Jr.: I offer in evidence a photograph of rings depicted there as C-36 and C-6, which show rings identified as C-36 and C-5 as a part of Exhibit P-4.

(Received and marked Exhibit D-30.)

Mr. Cooper, Jr.: I offer in evidence as Defendant's Exhibit D-31 a photograph depicting rings identified therein as C-40 and C-27, which depict 567
rings identified as C-40 and C-27 in Exhibit P-7 already in evidence.

(Received and marked Exhibit D-31.)

Mr. Cooper, Jr.: I offer in evidence a photograph depicting rings identified therein as C-25 and C-26, rings which are identified as C-25 and C-26 of Exhibit P-7.

(Received and marked Exhibit D-32.)

Mr. Cooper, Jr.: With that, the defendant Jungersen rests.

568 *Plaintiff's Witness, Abraham Slatis, Direct*

The Court: Is there anything further?
Mr. Groner: Nothing further, your Honor.

Depositions.

ABRAHAM SLATIS, called as a witness on behalf of the plaintiff, having been first duly sworn, according to law, testified as follows:

569 *Direct-Examination by Mr. Groner:*

Q. Mr. Slatis, will you state your name. A. Abraham Slatis.

Q. And your age and your residence, please. A. 54, age; residence, 3436 Douglas Boulevard, Chicago.

Q. What is your occupation, Mr. Slatis? A. Well, I am a jeweler by trade.

Q. How long have you been a jeweler and where did you commence as a jeweler? A. I started as a jeweler in the City of Astrakhan at the age of 10.

Q. Where is the City of Astrakhan? A. It is right at
570 the junction of the Volga and the Caspian Sea.

Q. And what sort of jewelry work did you do at the age of 10? A. In those days we did most anything; all the way from a cane, you know, from a handle of a cane, to some rings, brooches. It had big variety. A jewcler in those days was sort of a jack of all trades.

Q. Did you practice the trade of jewelry from that time until you left Russia? A. Yes, sir, all my life.

Q. And when did you leave Russia? A. I left Russia in 1905.

Q. And where did you go and what did you do? A. I went to South America, to Argentine.

Q. Where? A. I went to Buenos Aires, Argentine Republic.

Q. And you were a jeweler there? A. Oh, yes.

Q. And follow your career on up, will you? A. Well, it is quite a long ways back. I was in Argentine about a year and a half. Then I went from there to Rio Janeiro. I worked in Rio and exhibited at the 1908 exhibition, Centennial of Brazil, and won a medal there and a diploma.

Q. For what sort of work was that medal awarded? A. Well, it was sort of a scene modeled in bronze. I modeled it up and had it cast in bronze.

Q. Following that? A. Following that I traveled in the interior for about a year on horseback in Brazil, and 572
came back to Rio, and then came to the United States in 1911.

Q. And when you arrived in the United States, what did you do? A. Well, I started as a jeweler again.

Q. Where? A. In New York City.

Q. What sort of jewelry work were you doing there? A. Well, I worked on the jewelry that was the style of that age, you see; in that period, rather.

Q. You mean by that you designed jewelry or you fabricated jewelry? A. That is right, and I soon came sort of to the top. In 1915, I made a ring that was considered a sort of a great piece of work. That ring was accepted by the Metropolitan Museum of Art in New York, and a 573
letter written to me by the Curator of the Museum. He says, "We appreciate your excellent workmanship and are glad to be able to show so good an example of modern goldsmith's work."

Q. Modern goldsmith work? A. Yes, signed by the Curator. It also had a writeup in the Chicago Tribune. They had at that time sort of a section, "Interesting Boys." Every week they would give in that particular column one of the outstanding boys, and in 1915 I was the subject of that article in the Sunday issue.

Q. Really? A. Yes.

Q. Now, go on from there, will you please, Mr. Slatis.

574 *Plaintiff's Witness, Abraham Slatis, Direct*

A. Well, from then on continued to work in New York City at some of the finest shops of high-grade jewelry up to 1917. Then I went into the army and I spent about a year and a half, including one year overseas in the trenches, and did some—

Q. In whose Company were you? A. I was in the Company of Undersecretary of War Patterson. He was my captain.

Q. After the war— A. Headquarters Company, 306th Infantry. My full title was bugler.

575 Q. After the war will you carry us on. A. Well, after the war I came back and went to work practically in uniform yet—didn't have a chance even to put on a civilian suit—for Dreicer & Company of New York, a Fifth Avenue concern.

Q. Are they jewelers? A. Yes. They had a store and a shop. You see they manufactured their own jewelry, and they had about fifty men working in platinum jewelry there.

Q. How long were you with Dreicer? A. Oh, must have been about a year or so.

Q. Then what did you do? A. Then I went to Europe with my wife; accompanying her. She went to study
576 abroad, singing, and we lived in various parts of Europe, but mostly in Italy, close to three years, and I worked there, too, at the bench for a man who was supposed—the firm was what they call in Italy the—he worked for the Royal Family, you know. It is a great honor. We then came back to this country, and I worked again in New York for about three years.

Q. After which? A. After which we moved to Chicago, where my wife was born. We had all the family here.

Q. About what time was it you moved to Chicago? A. In '27. December, to be exact.

Q. And what did you do then? A. I started to work for myself.

Q. Where were you located? A. I was located at 32 West Randolph.

Q. West what? A. Randolph.

Q. And how long did that continue? A. That was for about five or six months. You see I had space there with a friend of mine who had a shop, and I worked for myself there. I paid him rental for the space in his shop.

I then was recommended to a man by the name of James H. Winn. This Mr. Winn was in a class all by himself; an outstanding genius. * * *. Winn was an elderly man, and decided to retire. He was in that building for 45 years, and he didn't want to leave the place—simply close 578
it and walk out. He wanted to have somebody to represent him there, sort of continuing the work that he did for 45 years in that building.

Q. What building was that? A. The Fine Arts Building. Whether it was that building or the same locality I am not certain, you know, but he told me that he was 45 years there.

Q. When you moved in with him it was in the Fine Arts Building? A. It was in the Fine Arts Building. I know he was in the same room for 25 years: in that room.

Q. While you were associated with Winn— A. Winn took a liking to me and he picked me as his successor in 579
the room. He kept me there for three months and introduced me to his friends, customers, and told them I am taking over his shoes. He showed me a lot of tricks.

Q. Did he show you any tricks having to do with the casting of jewelry? A. Yes.

Q. Could you outline very briefly something of the tricks he taught you in that connection? A. Well, he showed me a trick, you see, whereby you could take an article with undercuts and reproduce it exactly by means of a rubber mold. What he used was a liquid rubber.

Q. How long were you and Mr. Winn associated? A. Three months together in the same room.

Q. Why was that association terminated? A. Because he went to California and lived there in semi-retirement.

* * * * * * *

Q. Did you buy out all of the properties which Mr. Winn had and which he had used as a jeweler? A. Yes.

Q. And you said, I believe, that after he left you carried on in the same place? A. Right.

Q. Did you make any articles in accordance with the process he taught you? A. Yes, sir.

Q. Do you have any of those articles with you now? A.
581 Yes.

Q. Would you mind exhibiting them? A. Yes, I will be glad to. Anything that wasn't in the photographs I imagine you do not want to see, so we wouldn't show it.

Q. That is all right. A. Now, you want me to give you a brief method of it, a brief description?

Q. No. I just want you to exhibit some of the products made according to the method which Mr. Winn taught you.

(Witness places certain articles on the table.)

582 Q. Did you witness the making of some photographs within the last three or four days? A. Yes, sir.

Q. I hand you a photograph which has marked on the front "Exhibit C-1," and ask you if this is one of the photographs the making of which you witnessed several days ago? A. Yes, sir.

Q. Now, I will ask you if from the rings that you have produced on the table before me you can identify any of the rings "A," "B" or "C" shown in Exhibit C-1? A. Yes, I can identify them; "A" and "C." The "B" ring is missing here.

Q. Now, will you pick out the "A" and "C" rings from the original rings on the table and place them direct-

ly over the "A" and "C" representations on the photograph? A. You see this ring (indicating) was cast with the sprues. This one (indicating) has the sprues completely off. It shows on the photograph.

Q. You are referring to "A"— A. Yes.

Q. —as being the photograph of the ring without the sprues? A. Without the sprues. The "C" has the sprues partly showing.

Q. And when you speak of the sprues partly showing you refer to little knobs slightly within the cavity wherein the stone will be mounted, do you not? A. Right.

584 Q. Now, referring to the "A" ring of Exhibit C-1, will you explain what that ring is; the material it is made of? A. It is made of silver.

Q. And how was it made? A. Well, this ring was made out of an original model which consisted of one-half of a ring made. This one-half of the original model—

Q. Excuse me just a minute. Do you have the half here? A. Yes, I have (producing same).

Mr. Groner: The witness is producing the half to which he referred.

The Witness: Yes. This half ring was made into—a rubber mold was made out of the half.

585

Mr. Groner:

Q. Who made the half that you now hold in your hand? A. I make the original.

Q. What is the half made of? A. Silver.

Q. You made the original silver half that you now hold? A. Yes.

Q. And what was the next step? A. The next step is to make a rubber mold and to produce waxes from the mold.

Q. Excuse me just a minute. A. Yes.

Q. How do you make the rubber mold to which you have referred? A. Well, the rubber mold—the ring is mounted first.

586 *Plaintiff's Witness, Abraham Slatis, Direct*

Q. On what? A. Well, it could be a piece of wax or plasterscene. It is molding material. It is sort of a clay, and then it is painted over with the sprues attached to it.

Q. How is the sprue attached to it? A. By means of sticky wax. It is well known to the trade and the profession. Then the thing is covered with rubber, with liquid rubber.

Q. When you say the thing is covered with liquid rubber, do you mean the entire inner and outer surface of
587 the half ring? A. No. You cover just the outer surface, while the inner surface is blocked out with the wax or plasterscene in this case. Then the plasterscene is removed and another layer of rubber of a different color, see, preferably black and white, you know, is then covered from the inside and over the outer surface of the rubber of the first layer. A suitable separating medium is placed on the rubber so that the other one wouldn't stick to this one.

Q. So that this outer rubber cover doesn't stick to the inner rubber cover? A. That is right. It is then parted on a suitable line with a small pair of scissors and removed, and you have your mold made. Of course, I
588 want to add that you put in a plaster backing on the rubber. The rubber is backed up with plaster.

Q. In order to— A. In order to keep—the rubber itself would be a very thin shell, and you have the plaster backing there inside it.

Q. To give it strength? A. To give it strength, and it helps to hold the rubber shell in place.

Q. Now, having made your rubber mold, what is your next step? A. The next step is to make a wax replica from the mold. I mean to pour wax into the mold and get wax replicas from your original model.

Q. How do you put the wax into the mold? A. The wax is cast centrifugally.

Q. Did you have a machine to perform this function? A. Yes, I had a home-made machine that was made by Winn and left with me.

Q. Do you still have that machine? A. I still have that relic.

Q. I hand you a strange-looking contraption and ask you if that is the machine to which you refer? A. That is it exactly.

Q. I now hand you a photograph, marked Exhibit C-3, and ask if that is a photograph of the machine which you have just identified? A. That is an exact photograph of it. 590

Q. Did you see that photograph actually taken? A. Yes, sir.

Q. Would you explain the operation of that apparatus? A. Well, this apparatus was rather very primitive. You put your crucible, your container for the wax and mold—

Q. Wait a minute. Would you point on the photograph to the place where you placed the melted wax. A. You see there were a few clamps that are missing here, that I haven't got. They were loose. I couldn't find them.

Q. All right. Will you take a pen and point to the place on the photograph of the apparatus, Exhibit C-3, 591 where your melted wax was placed? A. Well, there was a container, a crucible, that came right here, (indicating).

Q. Will you mark that with the letter "A"?

(Witness does so.)

The Witness: The mold was placed right here (indicating).

Mr. Groner:

Q. Will you mark that with the letter "B"?

(Witness does so.)

592 *Plaintiff's Witness, Abraham Slatis, Direct*

Q. On the shaft that you have just been referring to at the opposite end is what appears to be a ball? A. That ball was the balancing ball and was moved to balance the weight of your mold and crucible.

Q. Would you mind designating that by the letter "C"?

(Witness does so.)

Q. Now, does that entire part of the apparatus, "A," "B" and "C," revolve? A. Yes.

Q. On what axis? A. On axis wheel designated here "D."

593 Q. Now, the shaft on the axis "D" has a wheel at its opposite extremity. Do you see that wheel? A. Yes, sir.

Q. Will you mark it "E"? A. There are two wheels there.

Q. All right. Then mark the first one "E"? A. The inner?

Q. The inner one "E."

(Witness does so.)

Q. What is its function? A. Its function is to keep the whole shaft stationary in right angles position, in horizontal. By tightening this wheel it keeps—

594 Q. The wheel "E"? A. It keeps the shaft in a horizontal position.

Mr. Groner: The witness is referring to the shaft "D-E."

Q. Now, there is another wheel at the extremity of that shaft that looks like a pulley wheel? A. Yes. We will call it "F."

Q. "F," if you please. And will you explain its function? A. This wheel has a hole in the groove.

Q. A radial hole in the groove? A. That is right.

Q. Now, explain the function of the wheel "F" and

the radial hole to which you have referred? A. We had a string with a metal piece fastened to it. That was usually done by means of a piece of tubing, you know, and you pull the string through the tubing. This piece of metal was inserted through the hole, and then you wound the string in the groove, about four or five rounds, and by pulling the string it started the machine in motion. This was usually done by pulling it with a jerk, and the wax or metal, whatever you had * * * on the platform A * * * was forced into the mold which was resting on platform "B."

596 Q. At the base of this apparatus is a set screw? A. Yes.

Q. Can you explain its function? A. Its function was to fasten it to the bench.

Q. Fasten the whole apparatus to the bench? A. To the bench.

Q. Will you designate that as "G," please?

(Witness does so.)

Q. Now, Mr. Slatis, you have carried us through the step of forcing the wax into your rubber mold? A. Yes.

Q. Would you mind explaining the next step? A. The next step was to remove the wax from the rubber mold 597 and joining the two halves together.

Q. Excuse me. I don't understand what you mean by "joining the two halves together," because you have only spoken of one half up to now. A. Well, you cast several of them.

Q. Several wax halves? A. Several waxes, you know. You may cast only two or a thousand.

Q. Now, what are those waxes that you speak of? A. I didn't quite get you.

Q. What is the nature— A. Of the wax?

Q. Of the wax halves that you have spoken of. A. Well, the half wax had a great advantage in so far as

that the jeweler in making a ring didn't have to make a complete model, particularly when it is a complicated piece of jewelry. He was limited to just one-half of the ring. Then when he put the two halves together he never had to worry whether one didn't look exactly like the other. It had another advantage: That he could make most any size stone or finger size with just one-half original model.

Q. Well, now, as compared with your original model, or your original half model, what did your wax half look
599 like? A. It looked like the same as the original model was; like this (indicating).

Q. All right. Now, having made two or more halves of wax, what was your next step? A. The next step was to join the two halves by means of a spatula, slightly warmed over a Bunsen burner, and the joining of the two halves was usually done at a suitable place where it didn't spoil any designs.

The rest of the procedure is common knowledge to the dental profession. It is invested in—

Q. Let us go through it so that we will understand what it is. A. That is something practiced for years that any
600 dentist knows.

Q. Well, just explain it briefly. A. It is invested in a plaster-like material. The wax is burned out.

Q. Excuse me just a minute. What do you mean when you say "invested"? A. You pour this plaster-like material over it, and that is commonly known as investing in the dental trade. Then the wax is burned out.

Q. Is it known by any name in the jewelry trade? A. Well, at that time I do not know whether any jewelers were using it. It was very common to the dental profession.

Q. After the investment, what did you do? A. You burn out the wax and you—

Q. And what was the effect of the burning of the wax?

A. It formed a cavity of your original model in that plaster material, and then you forced your metals centrifugally, or by compressed air machine, which I used at that time, into the mold formed by the wax.

Q. Do you have among the rings before you on the table here any ring like "A" of Exhibit C-1 which has been cast but not finished? A. Yes, sir.

Q. Would you find it? A. That is one (indicating); that is two (indicating). Is that what you refer to?

Q. The witness is referring now to the ring which is photographed as "A," is that correct? A. Yes, sir.

Q. Now, will you refer to the original of the ring "A" 602
and tell me whether you can see a place or places on the face of that ring where the wax halves were joined together? A. Yes, sir. It is right here and here (indicating).

Q. Now, referring to the photograph "A," will you make slight marks at the closest place on the photograph to the lines you have just referred to?

(Witness does so.)

Q. Now, referring to the ring which is shown in the photograph, Exhibit C-1, as "C," will you explain where there is any difference between that ring and the ring 603
shown as "A"? A. There might be a slight difference in size of stones due to the joining, but not—

Q. When you say "due to the joining," what do you refer to? A. Of the two waxes, of the two halves; though the design is the same.

Q. Are the rings made of the same material? A. Yes, sir, same material; same method.

Mr. Groner: I introduce as Plaintiff's Exhibit C-1 the photograph so marked and showing rings "A," "B" and "C."

I introduce as Exhibit C-2 the original half model about which the witness has testified.

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I introduce as Exhibit C-3 the photograph of the centrifugal casting machine.

I further introduce as Exhibit C-4 the original machine of that photograph.

I introduce as Exhibit C-5 the original of ring "A" of Exhibit C-1.

And as Exhibit C-6 I introduce the original of the ring shown as "C" in Exhibit C-1.

Q. I now hand you another photograph, which I am marking Exhibit C-7, and ask you if you can identify it?
605 A. Yes, I do.

Q. Will you explain when that photograph was made and whether you saw it made? A. Yes, I saw it made, I guess last week, if I remember correctly.

Q. Now, among the rings before you are you able to pick out any which are shown in Exhibit C-7? A. Yes, sir.

Mr. Groner: The witness has placed a ring over the representation shown in the photograph as "A," another over that shown as "B," a third over that shown as "C" and a fourth over that shown as "F." He has also placed half of a ring
606 over the photograph shown as "D."

Q. Now, referring to the rings "A," "B," "C" and "F," will you explain wherein they are alike and wherein they differ with regard to materials or the method employed or in any other respect? A. All these rings were made by the same method as your former exhibit.

Q. C-1, C-6. A. C-1, C-6. The materials in this exhibit "A," "B" and "F" are gold. "C" is platinum. The half ring "D" is silver. They differ in stone sizes, for which this method was designed, so that you can make out of one-half model a variety of shapes and sizes of stones and finger sizes.

Q. Is the design identical or is it different? A. The design is identical.

Q. And I believe you said that all of these rings, "A," "B," "C" and "F," were made from waxes made from the original half model "D"? A. That is right.

Q. I also believe you said—and I ask this question only to make certain—that these were made in accordance with the method which you have already described in some detail? A. Right.

Mr. Groner: I introduce as Exhibit C-7 the photograph to which reference has been made; as 608
Exhibit C-8 the gold ring shown in "A" of Exhibit C-7; as Exhibit C-9 the gold ring "B"; as Exhibit C-10 the platinum ring "C"; as Exhibit C-11 the gold ring "F," and as Exhibit C-12 the original half model of "D" of Exhibit C-7.

All of these refer to Exhibit C-7.

Q. I now hand you another photograph, Mr. Slatis, marked Exhibit C-13, and ask you if you can identify it? A. Yes, sir.

Q. Was that made at the same time and in the same way as the other photographs to which we have referred this morning? A. Right. 609

Q. Can you from the rings before you pick out any of those shown in that photograph, Exhibit C-13? A. Yes, sir.

Mr. Groner: The witness has placed half of a ring over the representation marked "A," rings over the representations marked "C," "E" and "F," and another half of a ring over the representation marked "D."

Q. Referring to "A," will you explain to me what it is? A. It is a silver half ring.

Q. Is that used as a model? A. That is an original.

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Q. Was that made by you? A. Yes, sir.

Q. Is it a representation of a completed ring made from the waxes which are made from that half? A. Yes, sir. That is ring "C" (indicating).

Q. What is ring "C" made of? A. Made of gold.

Q. How is it made? A. Same method as the others.

Q. I refer you now to the half marked "D" and ask you to tell of it, please? A. It is a half ring, original model.

Q. Was it made by you? A. Yes, sir.

611 Q. Are there any finished or partially finished rings shown in Exhibit C-13? A. Yes, sir. There is "E" unfinished, made in silver; half platinum ring finished.

Q. "E" and "F" are both— A. Same model.

Q. —made from the waxes made from the half model "D"? A. Right.

Mr. Groner: I introduce as Exhibit C-13 the photograph heretofore referred to; as Exhibit C-14 the half shown in the photograph as "A"; as Exhibit C-15 the original ring shown in "C"; as Exhibit C-16 the original half model shown in "D"; as Exhibit C-17 the original of the ring shown in

612 "E," and as Exhibit C-18 the original of the ring shown as "F."

All of these rings refer to the letters of Exhibit C-13.

Q. I now hand you another photograph marked Exhibit C-19 and ask you if you can identify it? A. Yes, sir.

Q. Was it made at the same time and in the same way as the other photographs you have referred to? A. Yes, sir.

Q. Are you able from the rings before you to find the originals of those photographed there? A. I have the reproductions. I haven't the originals here.

Q. I do not know what you are talking about. You will have to refer to a particular— A. I have the original, but it isn't on the photograph.

Q. The photograph shows two— A. Two rings.

Q. You are speaking of rings "C" and "D" now? A. That is right. I have the half of "A." I haven't the "B" here.

Q. Now, let's see if we can straighten this out. You have placed a ring over the representation shown as "C" and another over that shown as "D." You say you have the original or you don't have the original? I don't understand. A. I have the original, but it isn't on the photo- 614
graph.

Q. Then the photographs "C" and "D" shows two— A. Two cast rings.

Q. Would you mind producing the original. * * *

A. The original is produced (indicating).

Q. You have the original before you now? A. Yes, sir.

Q. Now, will you explain whether there are any differences, first, in the kind of ring represented by "C" and "D" and the original which you have produced and the others of which we have talked today? A. Yes, there is quite a difference. The original ring is an 18-karat gold ring, an old one, worn. This ring was given to me by 615
the Dee Company and was asked to reproduce it.

Q. And you were asked to reproduce it? A. Yes. I told them it can be reproduced, but I don't advise to go into such kind of castings because it will not be much of an inducement to the jeweler to cast such ring. "However, if you really want to see if I can reproduce it, I will cast you one in silver and one in platinum and show you that it can be done, but I am strongly against going into such kind of castings," * * * because those rings are usually made by dies, very cheaply, and it is a better article than a cast ring; in other words, the stamped ring is a better ring than the cast.

Q. Now, let us take the last thing that you said first. Why is a stamped ring better than a cast ring? A. Well, metal is naturally denser. It takes a better polish, too.

Q. When stamped than when cast? A. When stamped. Occasionally the stampings are reproduced with engravings and all kinds of little flowers which need not be retouched by tools, which a cast ring requires.

Q. Did you produce a silver ring and a platinum ring for Dee? A. Yes, sir.

Q. Do you have those rings? A. Yes, sir.

617 Q. Can you identify them for me? A. Yes, sir. "C," the silver (indicating).

Q. "C" of C-19? A. Yes. "D," platinum (indicating).

Q. And they are copies made by you of the original ring which Dee gave you? A. Including the stamp of the 18 karat in the gold ring. Inside it is stamped 18 karat.

Q. You are referring to the "C" ring there, are you not? A. It was reproduced in the silver ring.

Q. The original ring which you have produced has certain undercutting in it. How would you produce that undercutting in a stamped ring? I hand you the original so that you may answer. A. In a stamped ring this is made out of four pieces and they are just soldered to-

618 gether at suitable places.

Q. Now, in the ring, the silver ring, which you reproduced and which bears the stamp "18 K" on its inner surface, will you explain how that ring was made? A. That was also made with the rubber mold.

Q. And does the rubber mold account for the presence of this "18 K"? A. Right.

Q. On the inside of the band? A. Yes, sir.

Q. Now, has this ring been entirely completed? I am referring now to the reproduction "C." A. This ring is just as it came out from the cast.

Q. Does it show where the sprue or sprues were cut off? A. Yes, sir, right here on the bottom (indicating).

Q. Would you mind taking the pen and indicating on the photographic representation of the ring where the sprues were cut off? (Witness does so.)

Q. There was just one sprue? A. Yes, sir.

Q. Now, will you refer to the platinum copy "D" and explain to me the state in which that ring is? A. This ring is also just as it came out from the cast.

Q. Does it show or not where the sprue was removed? A. Yes.

Q. Will you make a mark on the photograph of "D" showing where the sprue was removed? (Witness does so.) 620

Q. Now, will you refer to the half model shown in "A" of Exhibit C-19 and explain what it is? A. This is a silver original model in half form.

Mr. Groner: Now, I introduce as Exhibit C-19 the photograph heretofore designated by that number; as C-20 the original half represented by "A" of the exhibit; as C-21 the silver replica represented by "C"; as C-22 the platinum replica designated "D" in the exhibit, and as C-23 the original which isn't shown in the photograph, but with regard to which the witness has testified.

621

Q. I now hand you a photograph marked Exhibit C-24 and ask you if you can identify it? A. Yes, sir.

Q. Will you identify it and explain to us what it is? A. These are rings cast from a finished model. By that I mean a complete ring; not as they were made before—in halves. This was done at the request of the Dee Company. Suppose a jeweler has a number of rings to make of one size stone, and it would be sort of impractical to cast rings in half where the same can be done by casting a whole ring. I showed them that I can cast a complete ring, and this is the sample.

Q. When you say "this is the sample," what do you

refer to? A. I refer to a ring that I showed them, which they still have.

Q. And which is not— A. Not shown.

Q. —represented by an actual physical specimen in Exhibit C-24? A. That is right.

Q. Do you have the original model of the rings shown on Exhibit C-24? A. The original model is with the Dee Company.

Q. Will you explain to me what the ring reproduced in the photograph "D" of Exhibit C-24 is? A. It is a
623 gold ring, and it is a reproduction from the original model which is held by the Dee Company.

Q. And the ring reproduced as "B," will you explain that to me? A. That is another ring of the same model.

Q. How is it made? A. This is made similar to the other method, except that you cover the whole ring instead of one-half.

Q. What material is "B" made of? A. "B" is gold, too.

Q. What is the difference between the rings "A" and "B"? A. Well, one has the oxide removed and the other one is still with the oxide on, as it came out of the cast.

624 Q. Do these two rings or either of them show where the sprue was removed? A. Yes, sir.

Q. Except that you made the waxes used as a step in the manufacture of these rings in complete form, rather than as halves, was there any difference between the process employed here and the process which you have described before today? A. None.

Q. I refer you now to the ring photographed in "C" of Exhibit C-24. Will you explain what it is and explain what the pedestal on which it stands is? A. That ring doesn't differ in any way from "A" and "B," except that the sprue and the button is still on it.

Mr. Groner: I should like to introduce as Exhibit C-24 the photograph heretofore designated by that number; as C-25 the gold ring shown in "A"; as C-26 the gold ring shown in "B," and as C-27 the gold ring with the sprue attached shown in "C."

Q. * * * sometimes after you had completed a ring did you make a further mold in order to make sample copies of the ring? A. Yes, sir.

Q. Do you have such a mold with you? A. Right. 626

Q. Will you produce it, please? A. Surely. Here is an actual mold made (indicating).

Q. Now, I hand you a photograph marked Exhibit C-30 and ask you if you can identify that photograph? A. Yes, sir. This is a photograph of the mold; various parts of it.

Q. Now, will you describe the mold quite slowly so that we can make references to the photograph, Exhibit C-30. Take one part at a time and identify it on the photograph. A. That is it (indicating). There are all the parts (indicating).

Mr. Groner: I note that the witness has placed 627
an appropriate part of the mold opposite the photograph on Exhibit C-30 and has placed two rings over the representations of rings there shown.

Q. Will you start with the black mold shown on the right-hand side of the photograph, in the center column, and mark that as "1."

(Witness does so.)

The Witness: Here is the first step: You take the ring that you want to make copies from and mount it, preferably on a piece of paper.

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Mr. Groner:

Q. The paper being rolled into a cylinder? A. Into a cylinder and inserted where the finger would be inserted in that part of the ring. A form of a sprew or gate is then attached to the ring and sometimes additionally secured by two little wires to the ring, all secured with sticky wax known to the trade. A rubber in liquid form is then coated over the entire surface, exposed surface.

Q. That is the entire external surface of the ring, is
629 it? A. External. I said the exposed surface.

Q. Yes. A. The inner part is not exposed. After the rubber is set a suitable separating medium is coated over the rubber.

Q. What is such a medium? Just illustrate. A. Well, say liquid cellophane, shellac, and so on.

* * * * *

Q. "1" represents your first external coat of ruliber, is that it? A. That is right. You then remove the paper from the ring, and this exposes the inner surface of the ring. Then another coat of rubber is applied to the inner surface of the ring, covering also the rubber of the first application.

630 Q. Is that second rubber coating shown in the photograph? A. Yes, sir. This second coating is preferably made in a different color from the first.

Q. Will you mark the second coating in the photograph as "2"?

(Witness does so.)

The Witness: After the second layer sets or dries a plaster casing or support is formed over the other part of the mold.

Mr. Groner:

Q. Is such plaster casing shown in the photograph? A. Yes, sir.

Q. In how many parts is this plaster casing? A. This plaster casing naturally is made out of two parts.

Q. Will you mark the parts shown as "3" and "4," respectively.

(Witness does so.)

The Witness: The casings are then taken apart. The outer envelope of the rubber mold—

Mr. Groner:

Q. Designated as "2" in the photograph? A. Yes— is cut with a little scissors. 632

Q. Where is it cut? A. At a suitable place, preferably in the center, and you remove it from the ring.

Q. I want you to take ink and, without messing up the drawing, show where the inner envelope "1" is cut and where the outer envelope "2" is cut.

(Witness does so.)

The Witness: The rubber is then re-assembled and placed into the plaster casing and low fusing metal may be poured into that mold. This pouring need not necessarily be by centrifugal force, as there is sufficient gravity in the metal to carry itself down.

Q. Are the rings shown at the top of the drawing, 633 C-30, rings made of that low fusing metal? A. Yes, sir.

Q. Now, will you explain any differences between this method and the method which you have described earlier today.

You might also describe the purpose of making this, if you will. A. Well, the purpose of this is to have a record of any article which jewelers usually keep or sometimes are compelled to send to some of their customers for various purposes, including insurance purposes. The method of this rubber mold differs very

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little from the wax mold, except that I may make additional cuts into the rubber mold where wax is to be poured in. That is about all.

Q. You have testified that in injecting wax into rubber molds your use centrifugal force? A. Right.

Q. Why did you do that? A. Because of the lightness of wax, which wouldn't allow to go down into every crevice sufficiently sharp enough, which requires forced methods.

635 Q. Forced what? A. Forced methods.

Q. Forced methods? A. Yes, such as centrifugal force.

Q. And why is that not true when you are making the low fusing metal castings? A. Because the metal itself has enough weight, and in addition to that when an article is made just for the purpose of showing records there is no need of sharpness and absolute 100 per cent faithful reproductions.

Mr. Groner: I should like to introduce now as Exhibit C-30 the photograph heretofore referred to by that number; as C-31 the mold, in four parts, and shown in Exhibit C-30 as 1, 2, 3 and 4, which mold is now completely assembled, and I introduce as Exhibit C-32 one of the two identical low fusing metal copies shown at the top of the photograph, Exhibit C-30.

636

Q. Were the two rings shown at the top of the photograph, Exhibit C-30, made in the mold, Exhibit C-31? A. Yes.

Q. Is this mold, Exhibit C-31, representative of the molds made by you from an original half or an original whole model and used for the making of wax copies? A. Right.

Q. * * * There have been introduced in evidence here today a number of physical exhibits about which you have testified. These exhibits have been in your possession since made, have they not? A. Yes, sir.

Q. There have also been introduced some photographs of substantially all of these exhibits, with one or two minor exceptions. Are the photographs fair representations of the exhibits themselves? A. Quite fair.

Q. And you witnessed the making of the photographs, did you not? A. Yes sir.

* * * * * * * 638

Q. Mr. Slatis, you testified this morning that after Mr. Winn departed for California, you continued in his establishment, is that correct? A. Yes, sir; that is correct.

Q. How long did you continue in the office which Mr. Winn had maintained? A. I was there until August 1st, 1931.

Q. What caused you to leave in August, 1931? A. At that time I formed an agreement with the Dee Company for the promotion of a casting process, mainly platinum casting, or precious metal in general.

Q. How did you become acquainted with the Dee Company? A. The Dee Company had one of their agents 639
soliciting jewelry shops, a man by the name of Charles Pederson who knew me quite well and used to frequent my place quite often.

Q. What did Mr. Pederson do? A. Mr. Pederson was a salesman for the Dee Company and while I did not buy my materials from the Dee Company, he used to come in, for two reasons. First, as a friend and, second, trying to get me as a customer.

I once showed him a platinum casting, and he bec me enthused about it. But, in the midst of it I told him that this casting is nothing to be enthused about, because that casting was very brittle; that while I can

cast the platinum, and quite true in every detail, there is something about the platinum that after it is cast it becomes brittle as glass.

He suggested to me that if I can overcome that difficulty, this would be worth to me probably two million dollars, and he was in all earnestness about it.

I told him that if I tried a little harder maybe I can overcome it, and I see signs that it can be overcome, but due to lack of time, which was quite difficult for me to spare, having to maintain an office and a laboratory,
641 and a home to support, I could not give very much time to research work.

He came in one day with Mr. Radix, president of the Dee Company. I showed him the various things that I can do in casting, and I had quite an impressive display for him.

He told me then that he would let me know, and he would think it over, what he can do with me.

Pederson came the next day very much enthused about my meeting with Mr. Radix. He told me that Mr. Radix told him that if there is a man that can solve the problem of platinum casting, Abe Slatis is the man.

642 Q. May I ask a couple of questions right there— A. Yes, sir.

Q. Can you locate the time, or about the time, when Mr. Radix and Mr. Pederson came to see you? A. They came about in the spring, I should say around in April, or May, just about that time.

Q. Of what year? A. Of 1931.

Q. Now, at that time when you said you could cast platinum, but it was very brittle— A. Yes.

Q. —did you have any trouble casting gold or silver, or other metals? A. No, of all other metals I had quite an impressive display at all times.

Q. So this difficulty was confined to platinum at that

time? A. The difficulty was in the platinum, and the platinum difficulty was in the malleability of the metal after it is cast.

Q. Will you go on with your story, please, sir? A. Mr. Pederson told me that Mr. Radix would be willing to help me financially, and see if I can solve that problem, and if successful, he wants nothing for it; except to give him the preference. In other words, if somebody would give me $10,000 or $20,000 and he wants to pay the same amount; to give him the preference.

I thought it was very fair, and I made a verbal agreement with Mr. Radix, and he gave me access to all 644
the platinum I needed for experimenting, plus a monthly down payment in cash.

Q. When did that monthly down payment become effective, do you remember? A. Well, I will tell you, I would not like to go into the detail of how much money there was involved, and when it started, because this was done by Mr. Radix out of his own personal pocket, and I don't want to embarrass anybody any more than I have to. You see, I will testify for myself, but I don't want to testify too much for Mr. Radix.

Q. Well, did you proceed. A. (Continuing) These were personal checks that he gave me.

Q. Did you proceed to do work with the idea of avoiding the brittleness? A. I proceeded with work to avoid 645
the brittleness.

Q. Did you have any luck? A. And I sure was lucky enough, and I got it very quickly, the minute I started to work, and I saw results coming, and I sacrificed a lot of other things, and a great deal of it, and I solved it.

Q. Can you fix a date, or the approximate date when you solved this difficulty? A. This difficulty was solved about July.

Q. Did the Dee Company ask you to do any work for them before you became connected with them? A. Well,

there wasn't exactly work to do for them, but what they wanted was to establish whether I really have a method, and they told me to cast one thing and another, any certain things they would bring in today and they would like to see it done by tomorrow, or at least the day after, to see whether the reproduction is faithful, and sometimes instead of giving him one I would give him two, maybe three.

Q. Was that true of the rings which you got from Dee, and of which you made copies? A. That is true.

647 Q. Did you exhibit finished work to Dee prior to August 1st? A. The question is not very clear to me. What do you mean by finished work, a finished casting, or finished and completely polished?

Q. Finished casting, I will say. A. Finished castings; yes, sir.

Q. Now, will you look at the various physical exhibits which have been introduced here today and pick out from them and state to the reporter any of them which you showed to Dee before August 1st, when you became employed by Dee? A. All these were shown to the Dee Company before (indicating).

Q. Will you identify them so the record will speak for
648 itself, calling them off by exhibit numbers? A. Well, maybe we better start in the regular order. Off the record.

(Discussion outside the record.)

They were all exhibits shown before they agreed to go into this venture; all those reproductions were the material that influenced them to conclude the deal with me.

Q. Now, will you read off the exhibit numbers? A. Well, C-2—there is something missing, it jumps into C-5.

Q. Some of these things (indicating). A. C-5, C-6, C-8, C-9, C-10, C-11, C-12, C-14, C-15, C-16, C-17, C-18, C-20, C-21, C-22, C-23, C-25, C-26, C-27, C-29 and C-32.

Q. How about C-34? A. And C-34.

Q. Who of the Dee Company saw these exhibits to which you have just referred? A. It was Charles Pederson, Mr. Radix and Mr. Wahlen.

Q. Now, referring again to the exhibits before you, will you examine them and tell me which of those exhibits have undercutting? A. All of them with the exception of C-29.

Q. The woman's head? A. That is right, with the exception of the woman's head.

Q. Now, I pick just at random Exhibit C-27, and ask you if you will explain to me the nature of the undercutting in that particular exhibit? A. The nature of the undercutting would be the inner surface of the ring, the head of the outer surface of the ring, the two heads, and ornament that surrounds the head, are all of an undercut nature. 650

Q. Could you reproduce that ring, Exhibit C-27, by stamping? A. I would say definitely no.

Q. Will you state why you could not? A. Because of the nature of the design, that would make it difficult to reproduce that ring by stamping.

Q. Now, I refer you to Exhibit C-17, and ask you if that has undercuts in it? A. Yes, sir; even more than the former, than C-27. 651

Q. Could it be reproduced by stamping? A. Well, this ring could not be reproduced by stamping in its entirety, you know. This ring, perhaps, could be made by stamping; it is made in two halves.

Q. Now, coming back to your contacts with the Dee Company as a result of your conversations with them and your demonstrations for them, did you become employed by them? A. Yes, we signed a form of agreement as of August 1, 1931.

Q. And did you continue thereafter to work for them? A. I continued, I handed over all matter into their hands to promote the casting process. I was put on the pay

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roll under a special category, a laboratory was maintained for me, separately, and I was devoting my time in that laboratory until such time when this can be put on the market and certain revenue derived.

Q. Was it put on the market? A. No, it was never put on the market.

Q. Can you state why it was not put on the market? A. Well, they had several reasons for it. It happened to be just at the height of the depression period, 1931, 1932, 1933 and part of 1934, and the occasion was not ap-
653 propriate to approach the jewelry trade with the proposition that may cost them $500, $600 or $1,000, as a fee for teaching them.

So I stayed in the laboratory and the Dee Company was in custody.

Q. How long did you stay with the Dee Company? A. I stayed with the Dee Company until August, 1936.

Q. Have you had any connection with the Dee Company since that time? A. None, except friendly relations.

Q. What have you been doing since that time? A. Oh, experimenting at various other enterprises.

Q. Have you been able to find any of your original rubber molds used for wax casting? A. No.

654 Q. When you made a rubber mold, in ordinary circumstances, how many wax duplicates would you count on making in the mold? A. I never had occasion to make too many duplicates. When I made two, three or four, that was sufficient evidence that the method is practical. At no time did I have any occasion to turn them out by the bushel, so-called.

* * * * * * *

Cross Examination by Mr. Flocks:

Q. How old are you? A. Fifty-four.

Q. I believe you stated on direct examination that you were a jeweler by trade? A. That is right.

Q. Of course, you are familiar with chasing tools and engraving tools? A. Yes.

Q. All the tools familiar to the jewelry trade? A. Absolutely.

Q. And that you can use them as an expert? A. Quite well.

Q. And that you could finish jewelry? A. Yes, sir.

Q. In an expert manner, is that right? A. Yes.

Q. And that you could even make jewelry starting from a block, or the simple elements and build up a piece of jewelry, such as a complicated ring? A. That is right.

Q. And finished in an expert manner? A. Yes, sir. 656

Q. In other words, you could manufacture any of the exhibits, that is, manufacture things similar to the exhibits by hand? A. Oh, yes.

Q. You are perfectly qualified to do that and could do it? A. Oh, positively.

Q. You testified that you made handles for canes, and rings and brooches, and a large variety of jewelry of that kind? A. Yes, sir.

Q. I presume you made those by hand and finished them? A. Finished, yes.

Q. And they were works of art? A. Yes, sir.

Q. And they were good examples of works of art? A. 657
Yes, sir.

Q. Those were articles of jewelry? A. Yes, sir.

Q. The work that you did in Russia was the type where you finished jewelry by hand, and in South America? A. Yes, sir.

Q. You finished jewelry by hand? A. Yes, sir.

Q. Engraved it and chased it, is that right? A. Yes, sir.

Q. There isn't any question, then, that you were quite an expert at finishing jewelry, manufacturing jewelry by hand, and you no doubt exhibited your work and it was approved, and it received approval, did it not? A. I don't get that last word.

Q. The work that you did? A. Yes, sir.

Q. And exhibited it in the days in Russia and in South America, and they were approved as works of art, and acceptable as such? A. Yes, sir.

Q. For example, the ring that was accepted by the Metropolitan Museum of Art in 1915 was acclaimed as a good piece of work? A. It was 1916 it was accepted.

Q. 1916? A. Yes; it was made in 1915, but it was accepted in 1916, and it must have been a piece of art if the Metropolitan would accept it.

659 Q. It was made by hand? A. By hand.

Q. What type of tools, generally, did you use? A. Those commonly used by the jeweler.

Q. Such as chasing tools? A. Saws, engraving tools, and the ordinary tools used commonly by the average jeweler.

Q. Such as chasing tools? A. Yes.

Q. And later when you went to New York and worked in some of the high grade jewelry places, I believe you said on Fifth Avenue— A. Yes.

Q. —you did regular jewelry work there and used these saws and engraving tools and chasing tools? A. Yes.

Q. And manufactured jewelry? A. Yes, sir.

660 Q. And also the work you did for the royal family in Italy? A. Yes.

Q. Those were works of art, made by hand? A. Yes; that is right.

Q. And accepted as such and approved? A. Yes, sir.

Q. When did you first come to Chicago? A. I first came to Chicago in 1913.

Q. Where did you live in Chicago? A. I lived on Sacramento Boulevard.

Q. Do you remember who you lived with at that time? A. Oh, I lived with my former employee, Mr. Pritsker. I think, to be exact, it was 909 or 911 South Sacramento Boulevard.

Q. Can you describe the place that Mr. Winn had when you worked for him? A. Well, it had a reception room, which was also, it had a little show case there, two of them, and a working place in the back.

Q. Do you remember where that place was? A. Yes, 410 South Michigan Avenue, room 1041.

* * * * * * *

Mr. Flocks:

Q. Did Mr. Winn take you into his confidence at all times right from the beginning, when you first went to 662
work for him? A. No.

Q. What do you mean by that answer? Please explain it. A. Well, Mr. Winn—shall I tell them the whole story?

* * * * * * *

I don't know how brief I can make it, if you want to know the whole incident, how it happened. It was by sheer accident that the fellow took me into his confidence.

Q. You said on direct examination Mr. Winn was getting old? A. Yes.

Q. And decided to more or less retire and go west? A. Yes.

Q. It was at that time— A. Yes. 663

Q. —that he took you into his confidence? A. Yes.

Q. And showed you some of the tricks that he knew? A. But the tricks, you know, occurred by accident, that he gave me, really, tricks that he considered very, very valuable.

* * * * * * *

He let me into a lot of tricks, including that casting process.

* * * * * * *

This man Winn was a great genius, much better one than myself, I will say.

Mr. Flocks: You are modest.

A. No, people who knew him in Chicago, who knew Mr. Winn, it would be futile for me to say anything that I can compare myself with James H. Winn.

Q. Then you carried on Mr. Winn's work, you think, in a manner which Mr. Winn intended that it be carried on? A. That does not necessarily mean I carried on his work. I took over the place, and what customers came in, and they asked, they wanted a ring made, or a repair job, I did it for them; I continued the business.

665 Q. And you developed the casting process to what it is today? A. That is right.

Q. I believe you stated on direct examination that this was the original, this was an original model, and I am referring to Exhibit C-2, shown in "D" on Exhibit C-7? A. Yes, sir—no, that is not that one, that is not that, no (indicating).

Q. You are now stating that the photograph "D" does not correspond to Exhibit C-2? A. This is not the one, C-2 Oh, I beg your pardon. This is not shown on the photograph, this was no photograph taken (indicating).

Q. Will you tell me what "D" represents on Exhibit C-7? A. "D" represents one-half ring.

666 Q. "D" on Exhibit C-7 represents one-half ring? A. Yes.

Q. Exhibit C-2 is one-half of the ring? A. Yes.

Q. But the photograph "D" on Exhibit C-7 is not the photograph of Exhibit C-2? A. No—let's see; this is not the one, no.

Q. Will you tell me what C-2 is? A. That is one of the other rings.

* * * * * * * * * *

Mr. Flocks:

Q. Where did you get Exhibit C-2, Mr. Slatis; where does C-2 come from? A. I made it.

Q. How did you make Exhibit C-2? A. Oh, modeled it first by hand.

Q. In what medium? A. Wax, plasterscene.

Q. Then do I understand you to say that you carved it out of wax, and then what did you do after you had the wax carved? A. Cast it, touched it up.

Q. You cast it and touched it up? A. Yes, sir.

Q. This Exhibit C-2 is not a finished job, is it, this model? Is that a finished model? A. Yes; that is a finished model.

Q. Then I understand you to say that you sculptured— A. Yes. 668

Q.—the original of Exhibit C-2? A. Yes.

Q. Then cast it in metal, then touched it up to make Exhibit C-2? A. Yes.

Q. The part "A" of Exhibit C-1 represents— A. A replica of the other one.

Q. —represents a ring corresponding to the model of C-2, is that right? A. That is right.

Q. Does C-5 correspond to part "A" of C-1? A. Yes, sure.

* * * * * * * * * *

Q. In making a ring such as C-5 from C-2 * * * what were the steps that you took? A. Well, you made a rub- 669
ber mold—

Q. This rubber mold that you refer to, I believe you said earlier you never showed that to anyone until just now, is that right? A. The rubber mold, no.

Q. You don't have this rubber mold? A. No.

Q. You don't have it now? A. I don't have it.

Q. You don't know what happened to it? A. Oh, yes; it was all cumulated and I didn't do any casting for five or six years, now, and it sags, and it takes up place, and my place isn't much bigger than the whole room, and it was probably thrown out.

Q. You never showed that rubber mold to anyone? A. No.

Q. Is that true as to the other exhibits to which you have referred to today, and to which, at the close of the direct examination, you referred to in detail and identified by number, and a long list, you don't have any of those rubber molds? A. No.

* * * * * * *

Q. Then you produced today all the rubber molds which you have which relate to the exhibits concerning which
671 you testified today? A. Yes, sir.

Q. And the only rubber mold that you still have is the one referred to by Exhibit C-31 and is shown as parts 1 and 2 of Exhibit C-30? A. That is right.

Q. You never showed those to anyone, parts 1 and 2? A. No; I never disclosed my method.

Q. You never disclosed your rubber mold method? A. No.

Q. Until just now? A. Until just now.

Q. In other words, you kept it a secret? A. Oh, yes.

Q. You are positive that the model C-2 was the model used to make a rubber mold? A. That is right.

Q. From which the Exhibit C-5 was made? A. Yes,
672 sir.

Q. So that Exhibit C-2 corresponds directly to Exhibit C-5? A. That is right.

* * * * * * *

Q. You recall that in connection with the Exhibit C-4 * * * and the photograph, C-3— * * * you testified that this was used for casting metal? A. Both metal and wax.

Q. It can be used for casting metal or wax? A. For either.

Q. But you have used it for casting metal? A. I used it for casting wax.

Q. Have you used it for casting metal? A. No; I had a compressed air machine for the metal.

Q. You never used this for casting metal? A. No.

Q. You stated that relative to that long list of exhibits referred to right at the end of your direct examination that you only had occasion to make two, three or four waxes of each model? A. Yes.

Q. And that they were not for commercial purposes, they were used just to satisfy yourself that you could— * * * do a casting job? A. Yes.

Q. These weren't made for sale purposes, the exhibits to which I refer? A. Some of them I used to sell, sure. 674
Of course, I never told anybody it is made by such a process.

Q. In other words, you kept your process a secret? A. I kept my process a secret.

Q. Did you, in making up your finished articles, did you use a chasing tool? A. Yes; occasionally, yes, sure, you use.

Q. You did use a chasing tool on these things? A. Absolutely.

Q. On the long list of exhibits right at the end of your, referred to right at the end of your direct examination? A. Yes, sir.

Q. You chased them up? A. Well, some times I chased 675
them myself and sometime I would give it to a special chaser, a special list. There are special chasers in the trade that do nothing but chasing. Chasing tools sometimes require, maybe, three or four hundred pieces, and the one who specialized in chasing can sometimes do a better job than you can, because you have got to have so many tools for that, the various shapes and so on, so it would be better, sometimes to give it out occasionally to a special chaser.

Q. But you were perfectly competent to chase it yourself, and you have chased your jobs? A. Yes; some of them.

676 *Plaintiff's Witness, Abraham Slatis, Cross*

Q. After you made your waxes, wasn't it your custom to sculpture the waxes to bring out the detail? A. No, unless you, sometimes in handling it, you mar it, or something. But, there was no occasion, you know, to actually retouch the wax.

Q. In other words, just so you retouched the finished casting, that was sufficient? A. That was sufficient. You see, it required a little expert handling of the wax not to mar it. It is a very frail article that you were dealing with.

677 Q. Was this article, Exhibit C-2, made before or after you went with Thomas J. Dee? A. That was made before.

Q. You are positive of that? A. Oh, yes, definitely.

Q. Then I believe you stated this was a handmade, hand carved model?

* * * * * * *

A. No. This is still a cast article from a model piece. It is not—by your question it might be interpreted it was carved from a solid piece of metal, which it was not. It was made, molded and cast and just a little bit touched up.

678 Mr. Flocks: Touched up after it was cast?

A. Touched up after it was cast.

Q. Referring to some of the exhibits in that long list enumerated at the end of your direct examination, some of these castings are all of platinum, are they not? A. Yes, sir.

Q. They are the ones which you referred to as being as brittle as glass, is that right? A. No, not this one. The castings I referred to, the platinum ones, are all perfect castings.

Q. They were made before you went with Dee? A. Before I went with Dee.

Q. I believe you stated that on direct examination, that

all your castings, before you went with Dee, that were made in platinum, were as brittle as glass, and it developed after you went with Dee— A. No, no, no. You got it all wrong. The castings that I made that were brittle were long before. When I went with Dee, I had the platinum castings mastered. In fact, they gave me several things to cast, and gave them severe tests to see whether the platinum is malleable, and you will probably have an exhibit here that I cast, I did cast in the Fine Arts Building, and they had stones set into it, to see whether the platinum is malleable or not.

680

Q. Will you tell us the reason for the brittleness? A. Well, the reason for the brittleness of platinum is quite a mystery. The one thing I can say is that if you have some gypsum, if platinum in its molten form gets in contact with some gypsum, it is brittle. The full scientific meaning of why, where and when, I don't think I am capable enough to describe. But, it is a sort of established rule if the least contamination gets in platinum it will cause brittleness, and sometimes it will come out like a sponge, full of holes, actually like a sponge, and the Dee Company had a number of such castings that I deliberately made for them to show what can happen to platinum if the least bit of contamination is present. 681

Q. Can the ring, Exhibit C-6, be made with a die? Can it be made by die stamping? A. Not the way it is shown in its present form; if it is modified considerably. In its present form, as shown, that ring could not be made by a die.

Q. I ask the same question in connection with Exhibits C-9, C-11, C-10, and C-8? A. Whether they can be made by a die?

Q. Yes; and Exhibit C-32? A. The same answer applies in the last one.

Q. C-12? A. The same answer.

Q. I ask you the same question in connection with Exhibits C-15, C-25 and C-26? A. C-15, definitely no; C-25 and C-26, the same answer as with the others.

* * * * * * * *

Q. * * * Mr. Slatis, what ring is associated with Exhibit C-31? A. That ring is not present here.

Q. The ring that corresponds— A. The original ring is not here.

Q. Are there any castings that were made in this mold here? A. Yes; the low-fusing metal; there is the ring,
683 this one (Exhibit C-32).

* * * * * * * *

Q. When did you make the ring, Exhibit C-32? A. That was about 1931.

Q. Was this made before you went with Dee? A. Yes.

* * * * * * * *

Q. Then the molds of Exhibit C-31 were made before you went with Dee, is that right? A. Yes.

Q. And have been kept a secret up until now? A. Yes; all the time.

Q. What is the part of Exhibit C-16? A. That is a half ring.

684 Q. Did you make that? A. Yes, sir.

Q. What did you use it for? A. That is to make the rubber mold from.

Q. You made rubber molds from that? A. From this, yes.

Q. From the part of Exhibit C-16. Have you altered this part since you made the rubber mold to which you refer? A. It might possibly be.

Q. It is possible that you did alter it? A. I could not say yes or no, because this is something like thirteen years ago, and possibly after I made the molds and cast the ring, I find that this would take a little touch there, you know, and I would touch it up for future use, you

know. Sometimes, you know, you make a design and it sometimes lays around, and when you have nothing to do, you may pick up the original and say, "Oh, well, let me see that ring. I think this would take a little swing, and this might be a little better," and you possibly get it done.

Q. You are not entirely certain you made your rubber molds from that as possibly touched up now? A. No; I am not certain, as it is now I am not certain. It could very well happen that I touched it up long after the other one was made. As a rule, I used to be in the habit of taking out my originals and touching them up a 686
little. You always find that you can improve, especially when you expect to use that particular mold.

Q. Then, if that is your practice, then you cannot say definitely whether the models from which rings were made, or castings of rings were made, corresponds exactly to those models? A. No, sir.

Q. In other words, the models may have been touched up since? A. They may have been touched up since.

Q. So the two might not correspond? A. No.

Q. The model and the casting? A. No; and there might be a slight deviation in the various stages it goes through, you know; there might be a very slight deviation. But, the object is to get a certain finished product to the cus- 687
tomer.

Q. Then, isn't it true, Mr. Slatis, that the models to which you refer, or have been referring to, merely as samples of what you recall you have done rather than being exactly the same thing that you used originally? A. I will not compromise myself and state so definitely that it is an exact, it was not touched, and so on, something which goes back thirteen years.

Q. In other words, there is a possibility they may have been touched? A. It could be I touched it a little up in the interim.

Q. In some cases you did touch up those models? A. Yes, sir.

Q. Isn't it also possible that you touched up some of your castings, for example, didn't you chase up some of your castings? A. This can easily be seen. I don't think the castings were chased. That will show clearly, the castings were not touched.

Q. Isn't it possible, Mr. Slatis, that in carrying out your work that you first made a casting, and then made a new mold from that casting, from which you made some of these models? In other words, in doing your
689 work, not being satisfied with the reproduction of one of your models, you touched up the work that you did and then made another mold from which you made a casting? A. Sure, it could happen.

Q. In fact, you did such things? A. Quite often it happens you make a casting and you find you want to touch it up, and you touch this up, and use this as a model.

Q. I can appreciate that. I can see that would be a logical way to carry it out? A. It would be a logical way to do it.

Q. Isn't it possible that it was done in connection with
690 these exhibits to which you referred today? In other words, you cannot say definitely that these castings were made directly from the mold which was made directly from the original unretouched model? A. The samples shown here are practically all originals—not practically, they are the originals. Whether some of them were touched up afterwards, the models, not the castings, I could not state for sure whether they were or not. The chances are they were touched a little more for the benefit of improving it a little than making another mold. These are all complicated designs and so on, and a man is always inclined to look at that and say, "Well, I think I am going to give a little touch here, and a touch there," especially when you use it for any number of things.

Q. Did you keep a record of each casting that you made? A. No, I didn't keep any records.

Q. Then you cannot say definitely that none of these castings, you could not say definitely that every one of these castings were made from the unretouched model—I don't mean the castings were touched? A. That the model was touched.

Q. You cannot say whether they were made from the unretouched original model? A. No.

Q. It would be too long ago to remember? A. It would be too long.

Q. And you don't have any records of any castings? 692
A. No.

Q. So, with regard to these castings you cannot say definitely they were made from unretouched models? A. No.

Q. I believe you stated on direct examination that the molds, Exhibit C-31, shown in photograph Exhibit C-30, were not intended for wax? A. Were not intended for what?

Q. Wax; they weren't intended to be used? A. With very little variation.

Q. I mean, exactly as you made them, they were not intended for wax? A. No, because this was taken—I will 693
tell you why. I want to broaden a little the answer. This was taken from a ring with the stone set, complete. Now, if I am to pour the wax—this stone, and all—which you don't want to, when you pour wax. That is the only objection. Otherwise, the procedure is practically the same.

Q. I am not referring to the procedure, I am referring to what you actually use it for. A. To reproduce replicas.

Q. You didn't make it for wax, this particular mold of Exhibit C-31, shown in photograph Exhibit C-30? A. That is right.

Q. That was not used for wax? A. No.

694 *Plaintiff's Witness, Abraham Slatis, Cross*

Q. Was not intended to be used for wax? A. No.

Q. And you never disclosed that until now? A. No.

Q. Has this mold always been in your possession, this mold of Exhibit C-31, have you always had this? A. This one? I cannot remember exactly whether this mold was always in my possession because lately, you know, I sort of relaxed a little.

Q. That is, within the last year? A. In my secrecy about it, because I gave up hopes of ever making anything out of it, and I gave Mr. Wahlen a mold and it might be this one, and it may not.

695 Q. When did you do that? A. Oh, I don't know; some time ago, I don't remember.

Q. How long ago? A. I could not tell definitely.

Q. About a year ago? A. I could not tell exactly when, but I gave Mr. Wahlen a mold and told him—

Q. It was not more than three or four years ago? A. I would not commit myself to a definite date, because I don't remember. I know I gave Mr. Wahlen a mold and said, "Here is a present for you, if you want to use it, and maybe you want to have your kid play with it, cast things into it."

Q. Did you give it to him in connection with this par-
696 ticular controversy? A. No, it was not in connection with the case. It was given to him—he had a child, and maybe instead of buying a casting outfit, here is a regular mold, and your child will have a lot of fun pouring rings, or something.

Q. This was after you left Dee? A. After I left Dee.

Q. That is definite, you didn't give it to him until after you left Dee, until after August, 1936? A. Until after I left.

Q. That you remember definitely? A. Even that I would not commit myself. It was toward the end; I don't remember. I remember distinctly I gave him once a mold.

Q. Then you cannot even say definitely when you made this particular mold, this particular Exhibit C-31?

Mr. Groner: I object to that question. The witness testified twice, and once on cross examination, as to when he made that mold.

Mr. Flocks:

Q. Do you want to change your testimony? A. About what?

Q. As to when you made this mold, Exhibit C-31? A. This mold I made in 1931. 698

Q. That includes the plaster on the outside? A. Yes, sir.

Q. In other words, this was made in 1931, including the plaster? A. Including the plaster.

* * * * * * *

Q. While you were working with Thomas J. Dee in accordance with the agreement to which you have referred whereby you were compensated for work you did for Thomas J. Dee, I believe you stated on direct examination that you never went into production, you never made more than two, three or four waxes of each model, and that they never did commercialize on the process, is that correct? A. No—that is right, they didn't commercialize. 699

Q. Then that is correct? A. Yes, that was correct.

Q. Did they realize any profit on the work that you did there, I mean, this research work in accordance with your agreement, did they make any money on it? A. Well, I will tell you something, when it comes to research work you cannot ever evaluate as to whether a man earned his money or didn't.

Q. I am not questioning whether you earned your money. I appreciate you must have done a lot of good work for Thomas J. Dee. I can understand— A. What are you referring to?

Q. I mean, did Thomas J. Dee actually show a profit on the books, did they make money on it, was there any way they could possibly make money? A. On this process?

Q. Yes. A. No; I don't think they did.

Q. That is what I had reference to. I know you earned your money. A. No, I don't know—some times you don't.

Q. I am not questioning that. A. Some times on research work you might keep a man five years without
701 making a dime on him.

Q. Your relations with Thomas J. Dee have always been cordial, and are cordial now; you are friends with Thomas J. Dee? A. Yes.

Q. And you have been since you left? A. Yes, sir.

Q. Do you believe there is any possibility that there was parting between you and Thomas J. Dee— A. When?

Q. When, possibly, Mr. Jungersen met the representative of Thomas J. Dee in connection with the Jungersen process? A. No, I don't think so. You see, I was the one to break up with Thomas J. Dee. I realized that it was not very profitable for me to stay there any longer,
702 and I felt I may be better by going out and trying to conquer a new field.

Q. Did you know of Mr. Jungersen at the time you left Thomas J. Dee? A. Yes, sir.

Q. Had you met him? A. Yes, sir.

Q. Did you know that he had a process? A. Yes.

Q. Of making jewelry? A. Yes, sir.

Q. At the time you left Thomas J. Dee? A. Yes; in fact, I was very friendly with Mr. Jungersen.

Q. You still are friendly? A. Still are, as far as I know. Maybe as far as he knows, maybe not; as far as I know, I am, and I believe he knows it.

Q. Did you know that Mr. Jungersen's process was a

success at the time you met him? A. At the time I met him?

Q. Yes. A. Well, I cannot really answer whether I knew it was a success or not. I don't think Mr. Jungersen himself knew whether it was a success.

Q. I mean, insofar as you know yourself? A. Yes.

Q. You saw Mr. Jungersen's work at that time, I believe? A. I saw a few rings, and they were nice.

Q. They were nice? A. Yes, they were nice.

. . . . . .

Q. At the time you were with Thomas J. Dee, I believe 704
you stated on direct examination that there was no occasion for Thomas J. Dee to turn out rings by the bushel, I believe you said; they never did go into production? A. No.

Q. And when you were with Thomas J. Dee, you never taught your process to others, is that right? A. Pardon me?

Q. When you were with Thomas J. Dee you never taught your process? A. No.

Q. You never even disclosed your rubber molds? A. No.

Q. In the place where you worked at Thomas J. Dee, 705
you had a private room? A. A private room.

Q. No one had access to the room except yourself? A. That is right.

Q. You had a key for that room, is that right? A. That is right.

Q. Did you have any safe, or lock box in that room? A. Oh, yes.

Q. Where you kept things you were working on? A. Yes, sir.

Q. You kept them a secret? A. I had my own safe there.

Q. Your own, personal safe? A. My own personal safe, that very same safe from James Winn.

706 *Plaintiff's Witness, Abraham Slatis, Cross*

Q. You had the combination? A. I had the combination.

Q. No one else had the combination? A. No one else had the combination.

Q. Did you have an anteroom, or back room, or was that one room? A. It was two rooms.

Q. If someone went into the outer room he could not see what was going on in the other room? A. No.

Q. Is that right? A. That is right.

Q. When you left Thomas J. Dee, you took your secret with you? A. I took the secrets with me.

707 Q. After you left Thomas J. Dee, did you know that Thomas J. Dee was a representative for the sale of licenses under the Jungersen patent? A. No, I didn't know anything about it. * * * I had a meeting at one time between Mr. Jungersen, Mr. McMahon, if you remember, and myself, and at that time they tried to make a sort of combination between the three of us, and I was not favorable to that combination. I was supposed to play, not a second, but a fifth part in the band, so I let it go, and I went out to conquer new fields.

Q. In other words, I believe they asked you to help instruct others? A. I don't know what my function would

708 have been, but I poured cold water on it.

Q. It was not satisfactory to you? A. Right at the beginning, I poured cold water on it.

Q. Who is Mr. McMahon? A. McMahon is secretary-treasurer of Thomas J. Dee.

Q. You know Mr. McMahon, do you not? A. Oh, yes.

Q. How much money did you get paid by Thomas J. Dee for the work you did for him? A. That is out of it.

Q. In other words, you are not answering? A. I would rather not.

Q. Were you hired by Thomas J. Dee? A. It was not in the sense of an employer and an employee. It was an agreement between us, a sort of partnership, to promote

this method whereby the Dee Company assumed the financial responsibility and I was supposed to be subordinate to them as to the business end. They had full control as to how to promote it. I got a weekly salary to keep me alive until such time as they can put it on the market.

Q. It never went on the market? A. It never went on the market.

Q. It never went to that extent? A. No.

Q. Was your entire salary paid at the office of Thomas J. Dee Company? A. Yes, sir.

Q. Did it all come from Thomas J. Dee? A. Yes, sir. 710

Q. You didn't get any money from any other source? A. No.

Q. Do you want to clarify, for the benefit of the record, just where the money came from? I believe on direct examination you stated that Mr. Radix paid it to you out of his own pocket? A. That is prior to my joining, while I was in the Fine Arts Building. Then you know—possibly it was not out of his pocket. I don't know what he may have done afterwards. He may have come into the office and claimed he should have been reimbursed for that money. I have an inkling he paid it out of his own pocket.

711

Mr. Groner: You are speaking now of before the first of August, 1931?

A. Yes. Whether it was really so; I would not swear to it.

Mr. Flocks:

Q. You really feel indebted, then, to Mr. Radix for his generosity and kindness? A. No, I don't feel indebted. I don't feel indebted at all. It was simply an enterprise that they took, and the fact that they didn't make any money on it is not my fault. It was up to them to make it. I was ready at any time they called upon me. If they

712 *Plaintiff's Witness, Abraham Slatis, Re-direct*

did not make it, it is their hard luck. But, there is no obligation.

Re-direct Examination by Mr. Groner:

Q. Mr. Slatis, you testified on cross examination, you were questioned on cross examination with regard to the retouching which you may or may not have done on certain of the original half models, and I hand you as il-
713 lustrative Exhibit C-2—if you would rather take in all the other original half models that is equally agreeable to me. I also hand you Exhibit C-5, which is a ring I believe you have testified was made from the wax or waxes made from the original half model, Exhibit C-2; and I wish you would tell us just how extensive, if any, any retouching might have been, would it have changed the basic design, or what would it be in fractions of an inch in any line or contour? A. Personally, from my examination I don't think that there is—

Q. The examination of what? A. Of Exhibit C-2 and Exhibit C-5. I cannot see any difference there.

Q. Do you mean by that that you believe there has
714 been no retouching? A. To my knowledge I don't think that there was any retouching.

Mr. Groner: Now, Mr. Wahlen, will you hand me the articles of jewelry which have been in the custody of the Dee Company.

Mr. Wahlen: I will (handing objects to counsel for plaintiff).

Mr. Groner:

Q. I hand you, Mr. Slatis, five rings. Have you ever seen them before? A. Yes, sir.

Q. Can you identify them? A. I certainly do.

Q. Do you know by whom they were made? A. They were made by me.

Q. Do you know when they were made? A. Some were made in—they were made in 1931.

Q. Now, I hand you all of your photographs, Exhibit C-1, Exhibit C-7, Exhibit C-13, Exhibit C-19, and Exhibit C-24, and ask you if you can find on any of those exhibits photographic representations of any of the five rings which you hold? A. Yes.

Mr. Groner: Now the witness has placed one 716
ring over the representation of ring "B," of Exhibit C-1; one ring over the representation of ring "E," of Exhibit C-7; one ring over the representation of ring "C," of Exhibit C-13; one ring over the representation of ring "B" of Exhibit C-19, and the fifth and final ring over the representation of ring "D," of Exhibit C-24.

Q. Now, addressing myself to the ring which I will designate as "B" of Exhibit C-1, I will ask if you can explain where, when, and under what circumstances, and for whom that ring was made? A. This is one of the very first rings that I cast, and Mr. Radix was very fond 717
of it, so fond of it that he asked me to finish it for himself. We had a stone set and put into it.

Q. Do you know whether Mr. Radix wore that ring or not? A. Yes, he did. It shows all the signs; in fact, it is all worn off.

Q. Is there any unusual characteristic about this ring in its present state? A. Yes; Mr. Radix evidently got tired wearing the same ring, and it was all worn off, worn out, and he made a new ring, and in order to remove the stone the ring was cut on one side, which eliminates the danger of breaking the stone, so the ring has

718 *Plaintiff's Witness, Abraham Slatis, Redirect*

a cut on one side, which was done for the purpose of faking the stone out.

Q. Will you take a pen and make a mark on the representation of ring "B" in Exhibit C-1 as closely approximating the cutting in the side of the ring you just testified to as possible? A. Yes, sir.

Mr. Groner: Now I introduce this ring in evidence as Plaintiff's Exhibit C-36.

719 Q. Now, addressing myself, Mr. Slatis, to the ring shown as "E," in Exhibit C-7, and I speak of the physical ring, now, can you tell us anything about that ring? A. Yes. This ring is a cast platinum ring and it shows all the evidence that it is cast, from the inside, and Mr. Radix liked that, also, very much, and he asked me to finish the ring up for him. I finished the ring for him and when he began to wear it he found it a little bit too heavy for him, and he soon changed his mind and went back to the old one.

Q. When you speak of the "old one" you are speaking of the ring Exhibit C-36? A. Yes, "B."

Q. "B" in Exhibit C-1? A. That is right, the ring
720 "B." The stone was removed from that ring and placed back into Exhibit C-1, "B."

Q. Referring again to ring C-36, will you take that ring, and will you look through the various physical exhibits that have been introduced here today, and see whether you can find among those physical exhibits the original half model from which the ring C-36 was made, and when I say "was made" I embrace all the steps of making waxes and that sort of thing. A. Yes. It was made from C-2.

Q. The original half model? A. Original half model C-2.

Q. Now, referring again to the ring shown as "E" in

Exhibit C-7, I will ask if you can find the original half model from which it was made? A. This was made from C-12.

Mr. Groner: I should like to introduce as Exhibit C-37 the ring shown as "E" in Exhibit C-7.

Q. Your statement C-12 means the ring Exhibit C-37 was made from the original half model, C-12? A. C-12, yes.

Q. Now, referring to the physical ring shown as "B" in Exhibit C-13, will you explain it to me, please? A. This ring was cast by the previous method and finished up completely, to have a finished product or so to show a jeweler how a finished cast ring, platinum cast ring, looks. 722

Q. Will you refer to the physical exhibits which you have and see if you can find the original half model from which that ring was made? A. That ring was made from C-14.

Mr. Groner: Now I introduce the ring represented as "B" in Exhibit C-13 as Exhibit C-38.

Q. Now, addressing yourself, Mr. Slatis, to the ring represented by "B" in Exhibit C-19, can you tell me anything about it? A. This was a platinum ring, cast and finished also for the same purpose, to show a finished cast platinum ring. 723

Mr. Groner: I introduce this as Exhibit C-39.

Q. Now, can you identify from the physical exhibits which you have the half model from which this ring was made? A. C-20.

Q. Referring to Exhibit C-25, do you recall which of the representations on Exhibit C-24 you stated you believed it to be? A. C-25 is "D."

Q. You may have said "D" before, but if you didn't

say "D" you mean to make it "D" now? A. I mean to make it "D" now.

Q. Now, I hand you the original ring which Mr. Wahlen just handed me and ask if you can tell which picture of Exhibit C-24 represents that particular ring? A. That represents "A."

Q. Now, can you tell me anything about that ring? A. This is an original ring, and "C," "B," and "D," were made out of "A."

Q. Will you explain what you mean by that, please? A. By means of a rubber mold to reproduce. This is the ring I referred to, what they asked me to make, in case you have a number of rings of the same stone, and it would purely be a saving of time, instead of casting half rings to cast the whole ring, which would take the same amount of labor, but it would save the time of putting together two halves.

On the request of the Dee Company, I made them several rings out of this ring.

Mr. Groner: You are referring to the ring shown in "A" of C-24?

A. That is right, to show them it can be made in one piece.

726

Q. Then ring "A" was not made by you? A. Yes, the ring "A" was made by me.

. . . . . .

Q. Will you please explain to me how this ring shown in "A" of Exhibit C-24 was made, and you may state what material it is. A. This is made out of silver, the original ring was made out of one half, and put together and formed the ring and cast and finished, then a mold made out of it.

Q. A rubber mold? A. Rubber mold out of it, and these three rings are cast from that one ring identified as "A."

Mr. Groner: Now I introduce the ring represented as "A" of Exhibit C-24 as Exhibit C-40.

The Witness: You can examine them all, including the original model (handing to counsel for defendant).

Mr. Groner:

Q. Now, referring to rings C-36, C-37, C-38, C-39 and C-40, I believe you testified that you made them in the year 1931, is that correct? A. That is correct.

Q. Can you fix a date in the year 1931 when you made them? A. Oh, it would have to spread between, all the 728
way between July and November—to the end of October.

Q. July to the end of October, 1931? A. Yes.

Q. After you had made them what did you do with them? A. I handed them to him; I showed them to the Dee Company and they were some times kept in my safe and sometimes in the Dee vault.

Q. Could you state the date when you actually and finally surrendered possession of those rings, or any of them, to the Dee Company? A. Well, C-36 and C-37, those rings, those were rings made for Mr. Radix, which were handed over to him, about September or October, around that time, between September and October.

Q. That is within a month or two of the time you be- 729
came employed by the Dee Company? A. That is right; because he was very anxious to wear the first platinum cast ring and be able to show it around, particularly this ring which shows definitely that it is the cast ring.

Q. And you are referring to? A. C-37; it shows definitely that it is cast. Few people believed at that time that platinum could be cast. When he took off the ring and showed it to a jeweler they gave one peek inside and said, "Oh, yes, it is a cast ring, all right."

Q. When you say that it is obvious, or whatever word you used, that it is cast, what is the reason that impels you to say that it is cast? A. Well, a cast ring leaves an

730 *Plaintiff's Witness, Abraham Slatis, Re-cross*

imprint which cannot be obliterated, or reproduced, by any other means, and which the professional man will readily see that it is a cast article, because this particular imprint would not be duplicated by any other means except by casting.

Q. Are you referring to the external structure of the ring? A. To the internal.

Q. The internal structure? A. Right here, this particular part here.

Mr. Groner: The witness points to the inside of
731 the ring immediately beneath where the stone would be set, that part not having been finished.

Q. Have these rings been in your possession since they were delivered by you to the Dee Company? A. Not since I left the Dee Company, I never had them; I never had them after I left the Dee Company.

Q. Did you have ring C-36 at any time after you delivered it to Radix? A. No, sir.

Q. Did you have ring C-37 at any time after you delivered it to Mr. Radix? A. Possibly just for the change of stones, see? There was a change of stones in question where he wanted to go back to the old ring, so he
732 probably gave it to me to take the stone out and put it back in the old one.

Mr. Groner: The witness is with you.

Re-cross Examination by Mr. Flocks:

Q. Mr. Slatis, as I understand it, on your re-direct examination you stated that the ring, C-40, was made from halves, and then finished to be used as a model in connection with the manufacture of other rings? A. Yes, that is right.

Q. When you say it was finished, I understand you

mean it has been chased up? A. Yes, chased up and touched up.

Q. To remove all the imperfections? A. To make it more or less presentable.

May I call your attention to that, to the old procedure, that those rings were more or less made for the purpose, for the sake of showing what can be done, you see, then to represent a piece of art, something like this (indicating). They were turned out quickly. For example, here you have an article, if you want to copy it, how would you do it? There wasn't much time wasted, 734
you know, to make it as particular as possible, although they are not bad, but I would not call them the last word in art; more or less passable work.

Q. Referring to Exhibits C-38 and C-39, I believe you stated that these were also finished up by making them presentable? A. Yes, sir.

Q. By that you mean they were chased? A. Chased.

Q. So the entire outside surface would show they had been worked on? A. That it would be a finished product.

Q. Therefore, they don't correspond, and when I say "they" I mean Exhibits C-38, C-39 and C-40, because the surfaces have been chased, they don't correspond to 735
the original models by reason of the chasing? A. By reason of the chasing there might be a slight deviation by the finish, just like would any other cast ring after it is finished.

Mr. Groner: Do you mind asking him to define the expression "chasing"?

* * * * * *

A. It means you have a tool, let us say, five or six inches long like a pencil, and may be perfectly round, or square, or some sort of design, and you hit it with a hammer and you drive this design into the article that you are intending to finish.

Q. In other words, if there is a low spot or hole on the casting, you can chase it up to bring the surface up? A. A hole is very hard to cover up; sometimes the more you chase it it digs up some more holes.

Q. In that case you can put a plug in and chase over it? A. It is sometimes done, even in a big casting, you might put a plug in, even in a big bronze casting, as it is done.

Q. And if there is a high spot that can be chased down? A. If there is a high spot that can be chased down.

Q. On the inside of the rings C-40, for example, more
737 particularly C-37—I would refer you to C-37, there is where you can see the cast surface which you say is attributable to a cast? A. Yes, sir.

Q. Is characteristic thereof? A. Yes.

Q. And that can be chased up? A. Inside, surely.

Q. That would be chased up inside so it would look like the exterior of C-39, for example? A. Yes.

Q. Which is chased on the outside? A. Yes; that can be done.

Q. It was done? A. In the other ones.

Q. In C-39, for example, on the outside? A. Yes.

Q. And the same is true of all the other exhibits that have been finished, they have been chased up? A. Some
738 were, some weren't.

Q. I mean, the finished ones that were chased up? A. The finished ones chased up, the unfinished are as they were.

Q. Is it possible in order to clarify what is meant by "chasing," take a little lump of metal and chase it up on the surface to make it look like a casting which has been chased up; in other words, if you take a piece of metal and chase the outside it would look like, it would look just the same as a casting which was chased up if you just chased over the surface? A. Yes, it could be possible, and for that very reason this ring, referring to, pardon me, what is it? Let's see—C-37 was deliberately left inside so

that people would not suspect that a ring was chased up and you simply claimed it was a casting. But, the inside of the ring is the evidence that the ring is cast and it was left that way for that particular purpose.

Q. That inside you refer to looks more or less like it has been sandblasted, which is characteristic of casting? A. Which is characteristic of casting, yes, sir.:

Mr. Flocks: That is all.

Re-direct Examination by Mr. Groner:

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Q. Again on the subject of chasing and I refer you in this connection to rings C-37, C-9, C-8 and C-11, will you explain to me with reference to any of those rings how much chasing as contradistinguished from polishing is necessary? Whatever ring or rings you may pick to talk about, please designate them by number so it will be understood. A. It would be very obvious to most any jeweler that the difference between C-37 and C-8 is a tremendous saving, and it would require very little.

Q. "Tremendous saving," I don't understand. A. Saving of time; and it will require very little finishing to bring up C-8 to the stage of C-37.

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Q. Would you chase it to bring it up, or would you simply polish it? A. No, that would have to be chased.

Q. Will you refer to Exhibit C-11? A. C-11 is about the same; so is C-9.

Mr. Groner: That is all.

(Witness excused.)

742 *Plaintiff's Witness, Hilda Lindgren, Direct*

HILDA LINDGREN, called as a witness on behalf of the plaintiff, having been first duly sworn, according to law, testified as follows:

Direct Examination by Mr. Groner:

Q. Would you kindly state your name, please, Miss Lindgren? A. Hilda Lindgren.

Q. And your residence? A. 1816 North Clark. That is the Hotel Lincoln.

Q. What is your occupation? A. Well, kind of book-
743 keeper, I guess, and I make up the pay rolls and all that.

Q. Where? What is the name of your employer? A. Thomas J. Dee & Company.

Q. And how long have you been employed by Thomas J. Dee & Company? A. Since May, 1906.

Q. Among your duties do you have the duty of keeping a record as to the commencement and termination of employment of an employee of the Dee Company? A. Yes, sir.

Q. Do you keep such a record in a book? A. Yes.

Q. Do you have the book? A. Yes, sir.

Q. Do you know Abraham Slatis? A. Yes, I do.

Q. Was he employed by the Dee Company? A. Yes, he
744 was.

Q. Do you have any record as to his employment? A. Yes, I have the time he started and the time he left.

Q. Would you refer to the book which you have before you— A. There we are (indicating).

Q. —and read exactly what there appears in so far as it relates to Mr. Slatis? A. His address and telephone number?

Q. Exactly. A. A. Slatis, 3436 Douglas Boulevard, telephone number Rockwell 3770. He commenced August 1, 1931, and he left August 19, 1936. That is all I have.

Q. Is that writing in your handwriting? A. Yes, sir.

Q. And is that book kept by you? A. Yes, no one handles it but myself.

Cross Examination by Mr. Flocks:

Q. Miss Lindgren, you state you kept pay rolls at Thomas J. Dee? A. Yes, sir, ever since I started there up to date.

746 Q. Was there any connection between A. Slatis and Thomas J. Dee after August, 1936? For example, did Thomas J. Dee sell A. Slatis materials so that A. Slatis would have to pay money to Thomas J. Dee for materials? A. I do not think so.

Q. Do you know what salary he did get: what salary A. Slatis got from Thomas J. Dee? A. We paid him $40 a week. He got paid on Saturdays.

Q. $40 a week, is that right? A. Yes.

Q. Was that consistent from '31 to '36? That was his salary? A. Yes.

747 Q. Do you know if he had any other remuneration besides his salary from Thomas J. Dee, paid to A. Slatis? A. I do not think so.

Q. As far as you know, there was none? A. No.

Q. Was A. Slatis employed like all other workmen or did he have some special arrangement? A. No, we very seldom saw him. He was working on different work from us.

Q. He was working on different work? A. Yes.

Q. Do you know what kind of work he was doing?

A. He was doing casting on platinum, I think, or in platinum. I do not know which is correct.

Q. Did he have a special room separate from the rest of the factory? A. Yes, he had his own place.

Q. Could anybody walk in and out of that room? Did you walk into that room? A. No, we would have to knock on the door.

Q. If you knocked on the door, would he let you in? A. Well, he would let me in.

Q. He wouldn't let you in? A. Yes, he would.

749 Q. Because you often brought him his pay check, is that right? A. He usually came up for it. I didn't go down there exactly.

Q. Did he have one room or two rooms? A. It was kind of narrow space he had. I think it was all in one room.

Q. Didn't he have an outside room or foyer of some kind so that if you were in that you couldn't see what he was doing in the inside room? A. No, I do not think so. I didn't pay too much attention. In fact, I was only there once, I think.

Q. You do not know much about his arrangements in that room, do you? A. No.

750 . . . . . .

A. G. WAHLEN, called as a witness on behalf of the plaintiff, having been first duly sworn, according to law, testified as follows:

Direct Examination by Mr. Groner:

Q. Will you state your name, your age and your residence? A. Albert G. Wahlen, 47 years of age, Homewood, Illinois.

Q. And what is your occupation? A. Employed by Thomas J. Dee & Company since 1913.

Q. In what capacity? A. Manager.

Q. How long have you been manager? A. That grows on you; it is difficult to say just when it originates, but a number of years, a great number of years.

Q. Let us approach the thing somewhat differently, then. In the period, say, between 1928 and 1932 what position did you occupy with Dee? A. In charge of sales and advertising, and general operations of the business.

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Q. Are you acquainted with Abraham Slatis? A. I am.

Q. How long have you known Mr. Slatis? A. Since 1931.

Q. When, and under what circumstances, and when I say "when" I mean as specifically as you can date it, did you meet Mr. Slatis? A. Reasonably specifically—I cannot give it to you by the exact date, and I won't attempt to, but it was prior to August, 1931, when we put him on the pay roll.

Q. At that time, or at the time you met him, what was the subject of your acquaintance with him? A. Our jewelry representative, Mr. Charles Pederson, deceased, brought information to the effect that a man had perfected a platinum casting, and, naturally, that interested us. We regarded it as a means of increasing our sales of precious metals.

753

Q. What was the nature of your conversations with Mr. Slatis prior to August 1, 1931? A. Directly I had no, had practically no direct contact with him. The discussion pertaining to the work was through Mr. Pederson.

Q. What indirect contact, if any, did you have with him prior to August 1st? A. By way of seeing what he was doing.

Q. Seeing? A. What he was doing in the way of fin-

754 *Plaintiff's Witness, A. G. Wahlen, Direct*

ished product, discussing it with our representative who was, in my opinion, too ambitious as to its promise.

Q. What did you see, generally speaking? A. Castings in platinum.

Q. Of what nature of article? A. Articles that provided a means of saving considerable time for the craftsman.

Q. What was the finished article, the article as finished, as it was when you saw it? A. I believe the first piece that I saw was a bowknot.

755 Q. Do you have that piece that you saw then? A. I do have.

Q. Do your have it with you? A. I do.

Q. Would you mind producing it? A. Not at all.

Q. Was this bow-knot a matter of any interest to you? A. Yes, it was the first platinum casting I had seen.

Q. Did you do any experimental or analytical work in connection with it? A. I had it drilled and a stone set in there, sapphire, merely to prove whether it would roll a bead.

Q. Did it roll the bead? A. There is the evidence (indicating).

Q. You mean by the statement, "There is the evidence,"
756 that it did, or that it did not? A. To the best of everyone's opinion in the jewelry business that we submitted it to had all the necessary qualities.

Q. Did you thereupon ask for further samples of Mr. Slatis' work? A. Yes, we did.

Q. And were such samples adduced? A. From time to time there were numerous articles produced.

Q. Did he furnish such samples? A. He did.

Q. Now, there has been introduced in evidence today a considerable number of articles which Mr. Slatis has testified he made: I wish you would look over the list and explain which of those, if any, you recall having seen before, that you recall having seen at or about the time

of which you are speaking, that is, prior to August 1, or about August 1, 1931? A. May I ask a question on or off the record? I have never sat on one of these things, and I may be out of order. If I may state my reason, when you ask a question if I have seen these, or a similar article, I would rather have the question put in that way because I would not attempt to tell you right now whether I have seen this identical one, and I don't want to go wrong on this thing. That is in fairness to you as well as to the other fellow.

Q. Very well. Answer the question with that in mind. 758
A. By number? Would it be a convenience to you as a matter of keeping records if we followed them numerically?

Q. Just read them off and say whatever you have to say on each one? A. I cannot say that I have seen these identical castings as enumerated.

Q. You mean the entire lot, now? A. I will qualify it by what I will say afterwards.

Q. All right. A. Exhibit C-10, Exhibit C-9, Exhibit C-11 and Exhibit C-8. However, I have seen and have in my possession rings—pardon me, a ring—which bears a definite resemblance to this group.

Q. Referring only to the group to which you thus far 759
addressed yourself, that is, Exhibits C-8, C-9, C-10 and C-11, and to the ring which you say you now have in your possession, did you, prior to August 1, 1931, see more than one ring of that particular type? A. Not that I can say, no.

Q. Will you progress to the rest of those before you? A. Exhibit C-5 and Exhibit C-6 bear definite resemblance to a ring cast for Mr. Radix.

Q. Before you go to any others, do you have in your possession the ring that you refer to as having been cast for Mr. Radix? A. I do.

Q. Will you produce it and compare it with those that

760 *Plaintiff's Witness, A. G. Wahlen, Direct*

you have just referred to and see whether it is just a resemblance or whether it is an identity? In asking you that I am not referring to the material of which it is made, or to whether it is one finished and one unfinished, but to the identity of the pattern and general design? A. The design, yes; the type, no.

Q. Now, let us put those aside for a minute. Going back to the group you spoke of first, to wit, Exhibit C-8, C-9, C-10 and C-11, do you have any ring in your possession at the moment like those rings? A. Yes; and again
761 the same question arises, difference in the setting.

Q. Otherwise an identity? A. The design a definite duplicate, apparently, in size and symmetry.

Q. Will you now progress to any of the other physical exhibits? A. Exhibit C-25, C-26, C-27 resemble a silver ring, which, as I recall, was one of the early rings submitted to Mr. Slatis through Charles Pederson to determine whether he could reproduce it accurately.

Mr. Flocks: I object to the answer as being hearsay and not being proper.

Mr. Groner:

762 Q. Do you have any ring in your possession like or similar to the three rings, Exhibits C-25, C-26 and C-27, to which you have just referred? A. I believe so; yes, I do.

Q. Is there any difference between those rings, other than the material of which the rings are made? A. It appears to be a direct copy.

Q. Will you go on to the other rings that you have thus far considered? A. Exhibits C-17 and C-18, no.

Q. You mean by that you don't remember ever having seen them? A. I don't recall having seen those, in particular. In other words, you see a lot of things coming through, but I don't recall those.

Exhibit C-15 bears a definite resemblance to one of our mountings?

Q. To one what? A. Of our mountings, similar to our No. C-38.

Q. Is that all? A. That is this; that is a platinum casting.

Q. Did you see any of them prior to August 1, 1931? A. That was well up, early in the work, in 1931.

Q. When you say "well up, early in the work," do you mean it was prior to August 1, or very close to August 1, or just a short while after August 1, or what? I don't expect you to know the date. I just want you to give me 764
your best recollection of the thing with as great definiteness as you can put it. You put whatever indefiniteness you want to, but just give us the most definite we can get. A. That kind of puts a guy on the spot.

When this man was first brought to our attention, every effort was being made to impress upon us his ability, his talents, and we saw much evidence of his castings, fine work. One item that I recall particularly was a fine platinum mounting that was exhibited in the Metropolitan Museum of Fine Arts, a beautiful platinum bracelet and a great many pieces where he had combined gold with platinum.

Most of this was, naturally, brought to our attention 765
at a time when we were considering taking on his work as part of our activity, which means that it must have been some time close to August, 1931.

Q. In that same time period do you remember seeing any articles duplicated? A. We actually put the question as to how long it would require to duplicate this silver ring, as an example.

Q. Did you get an answer? A. We did.

Q. What was the nature of the answer? A. We were trying to push for speed, to see how practical the procedure was, and whether he was stalling or not, we didn't

766 *Plaintiff's Witness, A. G. Wahlen, Direct*

know, but it usually meant that he would have it the following day. Then the question came up, can you produce more than one, indicating it would have some commercial value if he could, and if he could not, it was just something interesting, and he did produce duplicates.

. . . . . .

Q. Do you know whether, remembering the August, 1931, period, Dee issued platinum to Mr. Slatis? A. We did.

Q. Do you have any records of such issue? A. We do.

767 Q. Will you produce such records as you may have? A. Yes, sir.

Mr. Groner: Now, do you want to look at the original? I am going to withdraw the original and substitute a photostat.

Q. I now hand you the sheets, original, that you have just handed me, and two sheets of photostats, the first sheet of which is marked C-41, and I should appreciate your comparing and telling me whether the photostat is a true photostat of the original sheets? A. It appears to be.

768 Q. Will you examine the second page of it, also? A. It is.

Q. Are the originals taken from the regular records of the Dee Company? A. They are.

Q. Are those records kept under your custody? A. This I uncovered in a folder.

Q. What does that mean? Isn't the folder in your custody? A. In my custody.

Q. Now, can you explain the top sheet? A. This was a crude method of keeping a record of such metals as were issued through our man in charge of stock; and memorandum to Mr. Slatis for metal.

Q. Confining yourself for the moment to the first page;

just explain briefly how much stock it indicates was issued to him, the time period covered, and then what happened to it? A. From April 29th through June 26th, there was issued 60 pennyweight of 10 per cent iridium platinum, 90 pennyweight of soft platinum. Against this platinum was returned to stock, and it is recorded thereon, showing a net of platinum used in casting to the extent of 26 and 20/24 pennyweight of 10 per cent; 9 and 14/24 pennyweight of soft platinum.

Q. Is there anything you can say as to the returned 770
stock? There are apparently two items of return, to wit, 26 and 20 grains, 32 and 17 grains—what the nature of those returns is, that is, whether it was regular platinum returned, whether it was scrap returned, or whether it was cast platinum returned? A. The record here indicates that it was cast platinum, and put into a sample case that was left in charge of Mr. Charles Pederson.

Q. What is the basis of your statement as to that? A. Page 2, showing the date July 3, 1931, shows the entry credited to Slatis and charged to C. Pederson.

Q. If it had been returned as scrap, I take it from what you say it would not have been charged to C. 771
Pederson? A. Very likely would have gone right back into that metal to clear our stock as it goes to the plant.

Mr. Groner: I should like to introduce as Exhibit C-41 photostats of the two sheets to which the witness has just referred.

Q. Was there a conversation of which you had knowledge between Mr. Slatis and Dee relative to that contract? A. There was.

Q. As a preliminary thereto was there drafted and submitted to Mr. Slatis a questionnaire? A. It seems

to me that followed. That is looking back many years. I cannot say with any degree of certainty. My recollection of the questionnaire was after the specimens had been submitted and the question of entering into a contract was up for discussion, then I came to learn of this, and I stated there are some things I would like to know pertaining to casting before I would even entertain the thought of going into a contract. So, I prepared, from my knowledge of dental casting, questions that were intended to convey to me something about
773 the process, or technique. But, I didn't get very far.

Q. You did, however, prepare a list, did you not? A. I did.

Q. Do you have an original copy of the list prepared by you? A. I have a carbon copy of it. I believe it is a carbon copy. I do have.

Q. Is this a photostat of the carbon to which you refer? A. It is. This shows evidence of Mr. Radix having looked at it. That is his "22."

Q. Do you know whether this was ever submitted to Mr. Slatis or not? A. Any and all of that was handled through Mr. Pederson. I personally did not submit it to him.

774 Q. Do you know whether it was answered by Mr. Slatis? A. I never did get to see the answers. As I recall it, if you care to have me elaborate—

Q. Yes. A. He objected to the questions as being too pertinent, and felt that it would be divulging his stock in trade, or what he had to sell, and he chose not to answer them. That was the message that came to me through Mr. Pederson.

Mr. Groner: I offer in evidence as Exhibit C-42 a photostat of the questionnaire to which the witness has been testifying.

Q. There has been introduced in evidence today as Exhibit C-4 a queer looking apparatus. I would like to

ask you if you have ever seen it before? A. I have.

Q. When, and where, and under what circumstances? A. In a room provided for him to do his work in our building.

Q. And at what time with relation to August 1, 1931, did you see this machine? A. That was shortly after August 1st.

Q. What do you mean, "shortly after," a day, or a week, or a month or a year? A. For some time I showed definite indifference to his work. I viewed the man as an individual who did not want anyone to delve into what he termed his "secret," and I avoided any at- 776
tempt to enter his room until either through his expressed confidence in the fact that I would not grasp anything, or with the desire to show me an open house, he says, "Come down, I want you to see my room," and I did.

Q. Now, how would you place that time with relation to August 1, 1931? A. Within a month or two. That is a difficult thing to say with any degree of certainty, but it was early in the relationship with Mr. Slatis.

Mr. Groner: The witness is with you.

Cross Examination by Mr. Flocks: 777

Q. How old are you? A. How old am I? What did I tell you before?

Q. You are the witness? A. 47.

Q. You said that Mr. Slatis was put on the pay roll— A. That is right.

Q. Of Thomas J. Dee & Company— A. That is right.

Q. —the same way that everyone was on the pay roll? A. That is right.

Q. Do you know that to be definite? A. When you say the same way as anybody else, just what do you mean by that question?

Q. I mean on the pay roll, the same way. A. We drew money at the end of the week and paid him, yes.

Q. Did he receive his check like the other employees? A. He got cash.

Q. Did the other employees get cash? A. Everybody gets cash.

Q. In other words, he was treated the same as the others? A. Yes, sir.

Q. This relationship that you had, indirectly, with Slatis through Pederson was more or less indirect, and anything that you said on direct examination with re-
779 gard to such relationship depended upon what Pederson told you Slatis said, is that correct?

. . . . . .

A. No, sir; because any and all answers that I have made here today is based upon what I saw in the way of physical exhibits. Here is an exhibit that came to me through Mr. Pederson; yes.

. . . . . .

Q. On direct examination, Mr. Wahlen, you referred to a ring you had in your possession similar to C-11, C-10, C-9 and C-8? A. Yes.

780 Q. Which ring was that? A. Exhibit C-37.

Q. Was Exhibit C-37 always in your possession? A. It has been in our possession.

Q. You say "our possession"? A. Dee & Company, my possession, or the Dee Company, whichever you choose to call it.

Q. Where was this kept? A. In our vaults.

Q. When did you first get it? A. Back in 1931.

Q. Does that mean you personally? A. Mr. Radix had it.

Q. I meant Mr. Wahlen? A. Mr. Wahlen? No, personally I did not keep it since 1931. This was prepared for Mr. Radix for a star sapphire, similar to the other one.

Q. It was not prepared for you? A. No.

Q. It was not in your personal possession? A. No.

Q. Did you have jurisdiction over it? A. Oh, yes.

Q. Then you had access to it all the time? A. Like any of our stock, I have access to it. It is there to be accounted for.

Q. And at the time you received it you had no information as to precisely how Mr. Slatis made it? A. Excepting through casting.

Q. Except that it was made by some casting process? A. Of casting, yes.

Q. Other than that you didn't have any information as to the process? A. As to his technique, no.

Q. Then it was a secret, insofar as you know, at that time? A. That is right.

Q. Except as you stated it was a casting? A. Correct It was a secret, as far as we were concerned.

Q. And is the same true of Exhibits C-5 and C-6? A. That resembles C-36, a platinum casting.

Q. And the technique and process of making Exhibit C-5 and C-6 were secrets, so far as you were concerned, when you got that? A. Right.

* * * * * *

Mr. Flocks:

Q. Is the same true of Exhibits C-25, C-26 and C-27? A. They resemble C-40, a silver ring which we have.

Q. And the method of casting with regard to C-27, C-25 and C-26, was a secret, insofar as you were concerned?

* * * * * *

A. Yes.

Q. Is the same true of Exhibit C-15? A. Resembles C-38, a platinum casting, also prepared under a secret process unknown to me.

Q. Mr. Wahlen, as Manager of the Dee Company, no

784 doubt you have access to the records with regard to the issuance of metal? A. Yes, sir.

Q. And sales? A. Yes.

Q. How were the records usually kept? A. How are the records usually kept?

Q. How are the records usually kept at Thomas J. Dee? A. We have a perpetual inventory.

Q. And the perpetual inventory, is that on printed sheets, or in ledger form, or loose-leaf form? A. At that time, that particular time, it was on cards.

Q. On cards? A. That is right.

785 Q. Is the Exhibit C-41 similar to those cards, the Exhibit C-41? A. No, it is not. I can justify that, if you are questioning the accuracy of that particular record. Is that what you want?

Q. You can go ahead and justify it, and explain it? A. Every employee in the Dee Company is bonded and well regarded, and if and when there happens to be a transfer of metal that eliminates bookkeeping, we do sanction memorandum records. That happens to be a compilation made from memorandum, transfers of metal to a man, kept as a matter of record, against which he must show a return of the metal itself, or, as in this

786 case, a casting, or the residue buttons from the castings.

Q. You didn't keep those records yourself? A. No; that was kept in charge by the metal man at our counter.

Q. Was this record kept in pencil? A. This particular record, this one, yes.

Q. I mean, Exhibit C-41? A. Yes; that is a pencil record. That was merely a compilation submitted to Mr. Radix to justify what might have been the result of a failure in casting technique, manufacturing loss, of so many pennyweight, and he O K'd it.

Mr. Groner:

Q. You are referring now to the second page of Exhibit 41? A. Yes, which carries the date 7-3-31.

Mr. Flocks:

Q. These platinum castings which you saw, which you were told came from Slatis, by Pederson— A. Right.

Q. —could you tell whether they were iridium platinum or soft platinum? A. Yes.

Q. How could you tell? A. By the general character. In other words, you make a hard platinum and a soft 788
platinum, and you can see the difference between the two. That would be difficult for you to do it, but if you handled it long enough, it will take a different polish.

Q. Some of the platinum castings, you say, were of iridium platinum, and some, you say, were of soft platinum? A. They were.

Q. Did you have occasion to check them, chemically, to analyze them? A. Yes.

Q. You did analyze these particular castings you talk about? A. No.

Q. That is what I meant. A. No, they were complete castings, but when a man brings back a residue button, if there was any question in our minds as to whether 789
the stuff was as it was issued to him, it would never have gone back into our stock, it went back for reworking.

* * * * * *

Q. What is a residue button? A. The part which remains after the castings have been completed and trimmed to a point of eliminating that; in other words, if you are casting a ring you saw off the residue button, which means the sprue, and the button, excess metal.

* * * * * * *

Q. Did Slatis show you his whole process? A. No.

Q. He kept it a secret from you? A. That is right.

Q. How long did Slatis stay with Thomas J. Dee? A. He was with us five years.

Q. Do you know why he left Thomas J. Dee? A. Yes.

Q. Briefly, can you state why? A. Because we had not chosen to promote platinum castings, and he felt he had given us ample time to do so if we were going to, and he decided that he would terminate his connection, that is, granting that it was agreeable to us.

791 Q. Do you know Mr. T. G. Jungersen? A. I do.

Q. He is sitting in this room? A. Yes.

Q. Will you point to him? A. Right there (indicating).

Q. Did Mr. Slatis and Dee terminate their arrangements after you had met Mr. Jungersen? A. No.

Q. In other words, Slatis and Dee terminated their arrangements before you met Mr. Jungersen? A. No. If you are being very specific, your question, as you put it in the first instance, was not very clear.

* * * * * * *

A. How soon after we met Mr. Jungersen? Be more specific.

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Q. Did you meet Mr. Jungersen after August 1, 1931? A. After August 1, 1931, yes.

Q. Then did you meet Mr. Jungersen before August 1, 1936? A. Yes.

Q. Then it is— A. I would estimate I did. I don't think the five years went by without our having met. I am sure we did; I know positively.

Q. Then you know positively you met Mr. Jungersen before Slatis and Dee terminated, and it was after you met Mr. Jungersen that Slatis and Dee terminated? A. We met Mr. Jungersen some time before August, 1936.

Q. Did Thomas J. Dee ever represent Mr. Jungersen in connection with the sale of licenses? A. No.

Q. Under the Jungersen process patent? A. No, we did not.

Q. You have heard of jewelers known as J. Milhening? A. That is right.

Q. What is the full name of that company? A. J. Milhening, Inc.

Q. Did they have anything to do with the negotiation of the deal between Milhening and Jungersen? A. It all depends on how you look upon it.

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Q. Explain it, briefly. A. The details I cannot explain to you, because they were probably handled through Mr. Radix.

Q. But there was some deal that was handled by Thomas J. Dee? A. If you want to term it a "deal," yes, but I would not term it a deal. It was not under any definite agreement; in other words, there had been nothing entered into in the way of a contract whereby we were to represent Mr. Jungersen.

Q. Did Thomas J. Dee receive any money for services rendered on this deal? A. When you say "for services rendered," I don't know just what you mean. We did receive a check from Mr. Jungersen, which was accepted. Out of the kindness or bigness of his heart, or what it was, I don't know, but he sent the check to the Dee Company.

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Q. Did it relate to this deal with Milhening? A. It was said to be so-called commission on the Milhening deal. Now, to the best of my knowledge, the deal was already cooked. As I recall, when Mr. Jungersen came in, he mentioned that he has a deal with J. Milhening, and you could handle this, or we will handle it through you.

Now, I never heard anything further about it until the check came in. I know I had absolutely no part in sell-

ing the Jungensen technique to Milhening. Whether anyone else did, I don't know.

Q. Did Jungersen want Thomas J. Dee to represent him? A. He had expressed a desire to have us do so.

Q. Did Thomas J. Dee receive equipment from Jungersen? A. Equipment was sent on to Dee & Company.

Q. For the utilization of the Jungersen process? A. That is right.

Q. Did anyone learn the process with the use of this equipment through Thomas J. Dee? A. There was a man
797 who went with him to one of his accounts; that is, one of the Jungersen accounts.

* * * * * * * * *

Q. A man from Thomas J. Dee went with Jungersen to one of Jungersen's accounts? A. That is right, to see—

Q. With this equipment that came from Jungersen to Thomas J. Dee? A. I assume it was the same equipment.

Q. Did you see this equipment? A. I cannot say that I did.

Q. But yet you knew about it? A. I knew something
798 of some equipment having been sent on.

Q. Because of your position with Thomas J. Dee & Company? A. Yes, sir.

Q. Did you see the Jungersen process? A. No, I did not.

Q. In other words, you never saw this equipment being used? A. I don't know anything about his casting technique, nor the other fellow's.

Mr. Groner: By "the other fellow's" you mean Mr. Slatis?

A. Mr. Slatis.

Mr. Flocks:

Q. Do you know the reason for the obtaining of this equipment from Mr. Jungersen? A. He was interested in enlisting our cooperation.

Q. Do you know whether Thomas J. Dee paid for this equipment?

* * * * * *

A. Sigmund Cohen shipped one casting outfit to Mr. Jungersen care of Dee, and in May of 1937 Mr. Wahlen authorized payment for that outfit by Dee.

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* * * * * *

Q. Do you know that there were actual negotiations between Thomas J. Dee and Jungersen for a written agreement, that is, there were drafts prepared? A. Yes, sir.

Q. That is true, is it not? A. Yes; sir.

Q. They were prepared in the office of Thomas J. Dee Company? A. There was some notations made, that is, general discussion, or conditions under which we were to represent Mr. Jungersen.

Q. That is what I mean? A. That is right.

Q. There were negotiations or memorandums of discussions written up? A. That is right.

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* * * * * *

Q. What is the business of Thomas J. Dee? A. Refining and manufacturing precious metals.

* * * * * *

Q. * * * Do you merely refine and sell precious metals and nothing else? A. Anything pertaining to the sale of precious metals.

Q. For example? A. Well, if it chooses to do educational work—

Q. For example? A. We maintain a department for research and education.

Q. For example? A. Dentistry. Come in and I will show you how to build a good set of dentures, how to use more gold in the construction of dentures.

Q. What equipment do you sell? A. What equipment? Now?

Q. Now, or within the period we are talking about? A. All right. I would like to look at a price list, to be able to answer that.

Q. Do you sell casting machines? A. At the present time, yes.

803 Q. Centrifugal casting machines? A. Centrifugal casting machines.

Q. Do you sell a lot of them? A. Not so many. What do you mean by "a lot"? That is relative.

Q. Well, do you sell them every day? A. No.

Mr. Groner:

Q. What percentage of your business? A. Is that your business or mine? In other words, I think that is a very pertinent question. I don't think it should be answered. I hope that is not out of order.

* * * * * *

804 The Witness: We do, at the present time, sell the Roach casting machine.

Q. Do you sell these machines to jewelers? A. Do we sell them to jewelers? If a jeweler chooses to buy them, yes. We have no means of determining whether a dealer sells it to a jeweler, dentist or laboratory.

Q. In other words, you sell it to a dealer, you don't sell it direct to jewelers? A. Occasionally we sell direct.

Q. To a jeweler? A. That is right.

Q. Do you encourage the use of these casting machines in the jewelry trade? A. In a measure, yes. That is, we refer to the particular type of casting machine as providing a means for excellent results.

Q. Do you gain a sale of metal by encouraging the use of these machines? A. Likely to, in some spots.

Q. Do you instruct the customers how to use these casting machines, and how to follow out a jewelery manufacturing process with the use of these machines? A. They have been pretty well grounded in the work before they come to us to look for a casting machine.

Q. But do you teach as well as sell to those who have the groundwork, as you say? A. We have men in our organization who understand jewelry casting.

Q. And they teach? A. They don't make a particular 806
effort to teach.

Q. But they are qualified to teach? A. They are qualified to do it.

Q. And when requested to do it they do so, is that right? A. We don't want any men to get into teaching anything that is so involved, that takes so much time as jewelry casting; we cannot make any money doing that.

Q. Do you advise the trade that the Jungersen patents are invalid?

Mr. Groner: I object to that, and I will instruct the witness not to answer that question.

The Witness: Off the record. 807

(Discussion outside the record.)

Mr. Flocks:

Q. Do you sell these casting machines and advise the people that buy them that they don't have to worry about any outstanding patents?

Mr. Groner: I will instruct the witness not to answer that question.

Mr. Flocks: I asked the question, so that the record would be clear as to the interest of the Thomas J. Dee Company, indirectly, in this case.

and to show what interest the witness has in the outcome of this case.

Mr. Groner: The witness might think the patent is valid or invalid. That has no effect on whether it is valid.

Mr. Flocks: I have not asked the witness whether or not the patent was valid or invalid, but merely endeavored to make the record clear as to the company which the witness represents, that is, with regard to the position of the company.

809 Mr. Groner: I am sorry, I regard that as improper cross examination, and I shall instruct the witness not to answer it.

Mr. Flocks:

Q. Did Mr. Slatis have a safe in his room with the Thomas J. Dee Company? A. He had a safe down in his office, a small safe.

Q. Did you have access to his safe? A. No.

Q. So far as you know, everything he had in his safe was a secret?

* * * * * * *

810 A. I have no way of determining what he had in the safe.

Q. Do you sell metal to Ostby and Barton Company, Providence, Rhode Island? A. We do not.

Q. They are not customers of yours? A. No.

Q. They never were customers of yours? A. Never to my knowledge. It is a sweet account; I wish we had it.

Mr. Flocks: That is all.

Re-direct Examination by Mr. Groner:

Q. You are testifying here under subpoena, are you not? A. I am.

Q. You have no interest of any sort in either of the parties to this case, have you? A. None whatever. As a matter of fact, I never knew you until you came to town, and, frankly, I have been sucked into something. That is the way I view the thing. It has taken a great deal of my time, and I have resented it, and I just had to go through with it. 811

Q. Some question was asked you on cross examination on the Dee Company's failure to commercialize Mr. Slatis' methods of casting. Can you throw any light on the reason for that? A. Well, here is a man who works at a casting technique, has an idea as to what would be a suitable operating condition, a contract form which in our opinion was— 812

Q. You say a "contract form," what do you mean by that? A. A proposed basis for reimbursing Mr. Slatis, something that looked too much as though it was one-sided—

Q. I hate to interrupt you, but I still don't understand what you mean by worked out in contract form. Are you speaking of the relationship between Mr. Slatis and Dee, or between Slatis, Dee and possible licensees, or something of that nature? A. First of all, Slatis and Dee. In other words, we never really got to a point where I was satisfied that this technique was an entirely practical thing. I want to elaborate upon that, if I may. He can show me castings, he can show me economy in production, but I always raised this question, the same as I would to Mr. Jungersen: Is this method that a man has got to be an exceptional artisan to be able to follow, or is it something you could take and sit down, and in a half day, or day, teach a man really to do a job on them. That indicates the commercialism to me. In other words, where you can get it to do the job on them. The work was satisfactory, but I was never thoroughly satisfied on that, because he didn't want to impart the knowledge, or 813

information of his castings' technique until there was a definite consideration which, in our opinion, was a little top-heavy.

Q. Again, I ask you, are you speaking about consideration from Dee? A. This is first with Dee and Slatis. Now, times were bad. The depression was on, and it was anything but a proper time to undertake the introduction of platinum mountings where we were hoping to do volume business. So, the technique itself, though it had merit, it was the wrong time. You always look at market conditions, and if they are favorable, all right, you bring 815 out something that is going to give us a lot of money, and you will find buyers. But, if everyone was looking for a dime, or some place to get a cup of coffee, as they were back in those days, you are bucking up against a stone wall, and it would have been a waste of time and energy.

Q. Was there any question of the commercial feasibility, or worth, of the product of Mr. Slatis' technique, to use your expression? A. It showed evidence, definite evidence of effecting economy in production.

Q. I am speaking merely of the product, was it commercially acceptable? A. Yes.

816 Mr. Groner: That is all.

HARRY E. RADIX, called as a witness on behalf of the plaintiff, having been first duly sworn, according to law, testified as follows:

Direct Examination by Mr. Groner:

Q. Mr. Radix, will you state your name, your age and your residence, please? A. Harry E. Radix, Chicago, Illinois; 57 years of age; 325 Fullerton Parkway.

Q. What is your occupation? A. I am connected with Thomas J. Dee & Company, precious metal refiners.

Q. Do you occupy an office with Thomas J. Dee & Company? A. President of the company.

Q. Will you expand a little bit on your statement as to the business of the Dee Company? A. Well, we are refiners, manufacturers and dealers in precious metals, mainly gold, silver, platinum and the platinum metals, such as iridium, osmium, ruthenium, rhodium and palladium.

Q. How long has the Dee Company been so engaged? 818
A. It has been in business since 1889.

Q. Are you acquainted with Abraham Slatis? A. Yes, sir.

Q. When did you first become acquainted with Mr. Slatis? A. Well, I met him sometime in the early part of 1931, I would say.

Q. Under what circumstances did you meet him? A. I met him through our jewelry contact man, Charles Pederson, who met Mr. Slatis in his contacts around the city in calling on the trade, and so forth.

Q. By the way, did you know a Mr. Winn? A. Yes; James H. Winn.

Q. Do you know whether there was any connection at 819
any time between Mr. Slatis and Mr. Winn? A. I do not know exactly what the connection was, except that Slatis had his workship in connection with Winn's place on Michigan Avenue, and I believe later made some kind of a deal with Jimmy for either the complete business, or the shop end of it, something along that line. Just what the deal was in detail I do not know.

Q. What sort of a business was Mr. Winn engaged in? A. He was rather an individual, artistic jeweler, would be a good way to explain his business. He made rings of rather unusual design, fine stones, to individual order, and had, apparently, a very fine clientele in Chicago.

820 *Plaintiff's Witness, Harry E. Radix, Direct*

Q. Now, as to the time you met Mr. Slatis, what was your interest with regard to him? A. Mr. Pederson stated that Slatis was able to cast platinum successfully in the form of jewelry rings.

Q. That interested you? A. That interested me very much.

Q. What did you do as a result of that interest? A. I went over to see Slatis, and saw his set-up.

Q. Would you explain what you saw when you say you saw his set-up? A. I saw his shop, saw everything he had
821 connected with it, saw his models, saw rings and articles that he had cast out of platinum, and general investigation of what he could do.

Q. Now, I hand you an instrument which has been introduced in testimony as Plaintiff's Exhibit C-4, and ask if you can identify that, whether you have ever seen it before? A. It looks like the machine Abe had in his shop, and apparently made his castings with.

Q. You mean by that the shop that he had taken over from Mr. Winn? A. Yes.

Q. I now show you a photograph of that apparatus, Exhibit C-3, and ask you if that is a fair representation of the apparatus which I have just shown you?

822 . . . . . .

A. Yes, it is.

Mr. Groner.

Q. Now, I interrupted your story. Can you give us in such detail as possible an outline of exactly what you did see in Mr. Slatis' shop when you went over there? A. Well, he had a small, individual shop, without a great deal of machinery.

Q. Do you remember where it was located? A. Yes; it was on Michigan Avenue, known as the Fine Arts Building, I believe is the name of the building, upstairs on the

6th or 7th floor, back off the court, a small shop such as an individual operator would need for his work, and he had any number of models.

Q. When you say "models," what do you mean? A. They were models either of plaster or modeling compound of some kind, as well as numerous cast rings of various kinds, in gold, silver, platinum and brooches and odd pieces, quite a collection.

Q. Were these objects all different, or were some of them the same? A. Well, it was a conglomerate collection, some were apparently duplicates of models of a ring; 824
others were, of course, just individual pieces.

Q. What conversations did you have with Mr. Slatis at that time? A. Well, I asked him a few questions about his work, how he made these castings, whether he worked from original models, or duplicated models, or whether he had to have the original model, or whether he could duplicate a ring, or make more than one, and how fast his technique was, whether it was a one-man operation that would take a long time, time to produce an article, or whether he could work with some kind of a speed that would make it have a commercial value.

Q. Were you satisfied with the answers which he made to your various questions? A. Yes; I thought that he 825
had something that was new and different. A platinum casting * * *, up to that time, to the best of our knowledge, had not been done successfully.

Q. How about gold and silver castings? A. Yes; gold and silver casting had been made for the trade with a different technique, of course. The sand castings had been made for years, and cuttle fish castings had been made. Of course, they weren't very satisfactory.

Q. Were these castings which Mr. Slatis showed you obviously different from sand castings, or cuttle fish castings? A. Yes; they appeared to bring out the detail very much better; able to reproduce under cuts, and fine

826 *Plaintiff's Witness, Harry E. Radix, Direct*

detail that was missing in ordinary sand castings, or cuttle fish castings.

Q. Can you locate as definitely as possible the time of this initial discussion with Mr. Slatis? A. Well, it was early in 1931. Just the exact day or week I cannot remember.

Q. Well, of course, I don't mean to tie you down. I realize that memory is fallible. But would you place it as in the first quarter, the second, the third or the fourth quarter? A. I would say it was in the first quarter of
827 1931.

Q. Were you able to learn any details at all of the method which was practiced by Mr. Slatis? A. Well, very little definite information. Slatis was rather reluctant about telling us very much about his technique. We knew in a general way what he was doing, from our knowledge of dental castings and precision work that we have done in dentistry.

Q. Can you state as exactly as possible what you do know in a general way?

. . . . . .

A. Well, he made his castings by centrifugal force, and
828 it was a burn out wax technique, which we were familiar with in our dental work, and just how he made his molds we did not know at that time.

Q. Following the initial meeting, or meetings, with Mr. Slatis, did you cause to be made some products in order to satisfy you as to the worth of the work? A. Yes; I told our Mr. Pederson that, after all, conversation was cheap, and that I would have to see some castings made from definite models, or rings, or brooches, and so on, so that we could see the character of the casting and determine the physical properties of the casting, which were important things for us to know, mainly the malleability of the metal after it had been cast; the point whether or

829

not the castings were porous were important things that we wanted to know and find out, if possible.

Q. Pursuant to that instruction were any such articles submitted to you? A. Yes, sir. Mr. Slatis made up a number of castings, I don't remember just how many, and we looked them over and checked them as thoroughly as we could at that time.

Q. Now, I hand you a considerable number of physical exhibits which have been introduced in evidence here, and ask you if you will go over them, and referring to them by the exhibits numbers, tell us whether or not you have seen those articles, or any articles like those articles during the time you were negotiating with Mr. Slatis? A. Well, I would say that I saw most of this collection.

830

Mr. Groner: The witness is now referring to Exhibits C-2, C-5, C-6, C-9, C-10, C-8, C-11, C-12, C-14, C-15, C-16, C-17, C-18, C-20, C-21, C-22, C-23, C-25, C-26, C-27, and C-29.

The Witness: Not that one (indicating).

Mr. Groner: The witness states that he did not see C-34.

Q. Do you remember seeing, specifically, any of the following exhibits: C-2, C-14, C-16, or C-20? A. Well, it is very possible these rings, these shanks, or half rings were in the general collection of things that Slatis showed me. I mainly was interested in large platinum castings, such as rings, brooches, etc.

831

Q. Can you state definitely that you did see at some time any half rings? A. Yes; at some time in the period of 1931-1932, when we were working closely with Mr. Slatis, I saw sections, parts of rings, and the general collection was of so many pieces it is just hard to say the exact time. I don't remember whether it was 1931 or 1932.

Q. I hand you Exhibits C-21, C-22 and C-23, and ask you whether you saw, specifically, any rings like those, or similar to those? A. Yes; I saw a number of small platinum castings, ladies' rings, and so forth, but was not particularily interested in them at that time.

Q. Did your conversations with Mr. Slatis have any definite result, insofar as Mr. Slatis and the Dee Company is concerned? A. Yes; we made an arrangement with Mr. Slatis to go along with this work in a general way. We found a location for him over in the Pittsfield
833 Building, where our offices were, I believe on the 13th floor, a small space, and he set up his shop there and continued to work.

Q. Did the Dee Company bear all expenses of the office and that sort of thing under this new arrangement? A. Yes, sir.

Q. Can you tell me at or about the time the new arrangement became effective? A. It was in the fall of 1931, the late summer or early fall, somewhere along in there.

Q. Did you at any time cause Mr. Slatis to make a ring for you, personally? A. Yes; he made one of these heavy platinum mountings of the nude lady on the sides.
834 Q. I hand you five rings bearing Exhibit Nos. C-36, C-37, C-38, C-39 and C-40, and ask if you can identify any of those as the ring of which you have spoken? A. There is a mounting that Mr. Slatis made for me (indicating).

Q. You are referring now to the Exhibit marked C-36? A. That is right.

Q. Will you explain the circumstances under which that was made? A. Well, there was two reasons for it. I wanted to see Slatis reproduce a ring from a model, either a ring, model, or another model. That was No. 1. I wanted to see and be able to wear a platinum cast ring made by Slatis, that I could show to people in the in-

dustry and know definitely that it was a cast article, and made of Dee platinum, and so forth.

Q. Can you state the time at which this ring was made for you? A. Well, it was made some time in 1931, I don't remember exactly the month.

Q. Can you fix the date as definitely as possible with relation to the date of the consummation of a definite arrangement between Slatis and Dee? A. I would say it was made some time in the summer of 1931, before we made a definite arrangement with Slatis to continue with us on some basis.

836

Q. After the ring was made, do you know whether a stone was mounted in it? A. Yes, a star sapphire was mounted in the ring.

Q. Whose star sapphire was it? A. Mine.

Q. Yours personally, rather than the Dee Company? A. Yes, mine personally.

Q. After you received the ring, what did you do with it? A. I wore it.

Q. And for how long did you wear it? A. Oh, for a number of years, I don't remember exactly.

Q. Well, a year, or five years? A. I would say probably four or five years.

Q. During the time you wore it, was it shown to various people? A. Yes; to quite a number of people in the industry.

837

Q. When you ceased wearing it can you tell me what became of it? A. I had it in my desk all the subsequent time, because when I stopped wearing it I just put it away in my desk and left it there.

Q. How long did it stay in your desk? A. It has been in there ever since.

Q. Did you also cause to be made another ring by Mr. Slatis, and I am speaking of you, now, personally, rather than as an official of the Dee Company A. I liked this pattern—

Q. You are referring now to C-37? A. C-37. It looks like the very pattern. I had Abe make this ring for me, or a ring for me, but it was too heavy, and I could not wear it; it was too cumbersome. It hurt my finger, especially with a glove on, when driving. I turned it back and went back to my old mounting. This one, if I remember—

Q. When you speak of "this one," you are speaking of Exhibit C-36? A. That is right; Exhibit C-36.

Q. Continue. I didn't mean to interrupt you. A. This
839 one he made for me first.

Q. Exhibit C-36? A. Yes, sir; that is right.

Q. And referring to Exhibit C-37, can you tell me what happened to it after you determined it was too heavy to wear? A. Well, Mr. Pederson, my man, handled it for me, and I don't know whether it went back into the platinum casting items, or was turned in for scrap metal.

* * * * * * *

Mr. Groner:

Q. Then, insofar as Exhibit C-37 is concerned, you are not able to tell definitely whether the ring there shown is the identical ring made for you, or simply one like it,
840 is that correct? A. I do not think this is the identical ring, because the ring I wore had a stone in it, and when the stone was taken out they would have to saw through the bezel, and this ring looks like a newly cast item without having been re-soldered or repaired.

Q. When you say newly cast, what do you mean? A. I mean freshly cast, the original cast. In other words, this could be—

Q. The witness referring to Exhibit C-36. A. I might explain something that clarifies your point. This particular ring could be re-soldered, or filled in with platinum and touched up carefully by a jeweler and would look almost like a newly cast ring.

Q. Now, just to make the record perfectly clear on that, the witness refers to Exhibit C-36. Now, does Exhibit C-36, Mr. Radix, show that a stone has been removed from it? A. Yes.

Q. Will you explain just how it shows that the stone has been removed from it? A. Well, the bezel and the one side of the top, has been sawn through in order to open the bezel and allow the stone to be released.

Q. Now, I refer you to Exhibits C-38, C-39 and C-40, and ask if you are able to identify any of them? A. They look like castings that we had Slatis make, and were partially finished, polished, in order to see what the ring would look like in a partially finished condition. 842

Q. Do you know whether any of the products, other than Exhibit C-36, made by Mr. Slatis at or about the period of which we have spoken, have been retained in the custody of the company since that date?

. . . . . .

A. Yes; we have on hand now a number of pieces that were cast by Slatis during that period, either during the year 1931, or 1932, or some time.

Q. Do you know whether Exhibit C-37, C-38, C-39 or C-40, are of those castings? A. That I cannot remember exactly. 843

Q. Prior to the date you made a definite arrangement with Mr. Slatis, do you know whether the Dee Company issued to Mr. Slatis any platinum for the work which you have described? A. Yes; from time to time Slatis was given considerable metal to work with.

Q. Do you know whether any record was made of that metal by the Dee Company? A. Yes; they would deliver metal to him on what is known in our business as an interchange office or departmental record.

Q. I hand you two sheets which have heretofore been introduced here as Plaintiff's Exhibit C-41, and ask if you

have ever seen those before? A. I am not certain about C-41.

Q. Referring now to the top page, that is, the top page of Exhibit C-41? A. Oh, I definitely did see the second page.

Q. The second page being headed "J. Slatis," and bearing date 7-3-31, is that correct? A. That is right, sir.

Q. How can you be definite about having seen that page, Mr. Radix? A. Well, it carries my initials and the date.

845 Q. Would you mind reading exactly what it says that was placed there by you? A. The date, August 11th, 1931, in a circle, and the letters "O. K." and the initials "H. E. R." circled.

Q. And those figures and letters were placed there by you, they are in your handwriting? A. Yes, sir.

Q. Also prior to the time when a definite relationship was established between the Dee Company and Mr. Slatis, do you know whether there was prepared a questionnaire intended to be answered by Mr. Slatis? A. During the time when we had these discussions with Slatis Mr. Pederson and Mr. Wahlen, of our office—

846 Q. Is Mr. Pederson now dead? A. Mr. Pederson is now dead. I asked the boys to prepare a questionnaire that we wanted Slatis to sign and return to us, and I believe this questionnaire carried a long list of definite questions that pertained to the platinum casting work.

Q. Did you ever see that questionnaire? A. Yes; I saw it several times.

Q. I now hand you a photostat of a sheet heretofore introduced herein, as Plaintiff's Exhibit C-42, and ask if you can identify it? A. Yes; this looks like part of the questionnaire. It seems to me that there was more sheets than one, or the list of questions was longer than this.

Q. By the way, can you identify the figures at the lower left-hand corner of that sheet? A. No, not exactly. It looks like it might be mine, but I am not positive.

Q. Do you know whether Mr. Slatis ever filled out such questionnaire or not? A. Yes, he did. I am not positive whether he answered all the questions, or whether he changed the original question in some way and answered it according to his idea of the way the question should be asked, or not, but, there were numerous changes made in the questionnaire, and it traveled back and forth between Slatis, Wahlen and my desk a number of times; just how many I do not know. 848

Q. Have you made efforts to find the original? A. Yes, I have.

Q. Have you been able to do so? A. No, I have not been able to find the original.

Q. Now, after the time you or the Dee Company and Mr. Slatis made some sort of an arrangement, was there any commercialization of the Slatis technique? A. Well, I judge you mean by that whether or not we were able to sell or dispose of any of the pieces that Slatis cast for us?

Q. Yes. A. Yes; we made a number of castings for manufacturing jewelers in the City. 849

Q. Could you state for whom you made such castings, and as much information on the subject as is possible? A. If I remember correctly, we made a number of pieces for Spaulding & Company, through their shop foreman, or the man who operated the shop for Spaulding. Whether it was operated under Spaulding's name, under his own name, or what, I am not quite clear at this moment.

Q. What was his name? A. Morrie Spain, or Spaim.

Q. Have you made an effort to ascertain the facts as to such sale through the records of the Dee Company? A. Yes. Our Mr. Sweeney made a careful search and

found a ledger sheet at Spaulding & Company during 1931 and 1932, showing numerous items that were charged to them, but we were unable to locate duplicate invoices covering the transaction, because of the long time that has elapsed. When we moved our plant from East Ontario Street to our present location, 1910 West Kinzie, we destroyed a lot of old records that we had, that went back eight, ten or twelve years ago.

Q. Then I take it from what you say that the ledger sheet which you still have does not give sufficient identification to ascertain definitely what is what? A. That is right.

Q. Were there any other evidences of sale? A. Yes; we made a platinum ring for Juergens & Andersen Company, a fine store here in Chicago, which was made for them early in 1932. That completes it.

Q. Have you attempted to ascertain from the records of the Dee Company whether there is any evidence of this sale? A. Yes; we have a record of the transaction that was made with Juergens & Andersen.

G. H. MATSON, called as a witness on behalf of the plaintiff, having been first duly sworn, according to law, testified as follows:

Direct Examination by Mr. Groner:

Q. Will you state your name, please, Mr. Matson? A. G. H. Matson.

Q. What is your age and residence? A. 50; 1304 Galena Boulevard, Aurora.

Q. What is your occupation? A. Manufacturing jeweler.

Q. Are you an independent manufacturer? A. Yes, sir.

Q. Or are you connected with some one? A. I am independent.

Q. What were you doing in the period 1930 to 1933? A. Up until March, 1932, I was manager of Juergens & Andersen's shop.

Q. Where is that shop located? A. That is at 55 East Washington Street.

Q. As manager of that shop did you have occasion at any time during that period to purchase a ring from the 854
Dee Company? A. It was later than that.

Q. Can you state when it was, please? A. That was after I took over, I bought this shop.

Q. You mean you bought the Juergens & Andersen shop? A. Yes; then after I took it over I bought platinum and metals from Thomas J. Dee & Company for my own. Everything was changed over there to me.

Q. Did you at any time purchase from Thomas J. Dee & Company a platinum ring? A. Yes, sir.

Q. Could you describe the ring which you purchased? A. It was a mounting for an emerald cut diamond, a square type diamond. That diamond set in the top and the ring was a square top, what we call a square top, a 855
gypsy ring.

Q. Do you know, or are you familiar with the methods of making mountings? A. Yes, sir.

Q. Could you from your knowledge tell how this mounting was made? A. Well, yes, I can. It was very distinct in our minds, because it is something we didn't believe could happen. We had all been in the business a good many years, and Harry Radix offered to cast a platinum ring.

I said, "You have got to show me." And he did. He cast this platinum ring. It didn't come out very perfect, and I raised a lot of fuss about it. Nevertheless, by

856 *Plaintiff's Witness, G. H. Matson, Direct*

maneuvering and filling in the pores, which we had to do at a lot of extra expense, the ring came out in pretty good shape and was delivered to the customer.

Q. Do you have any written evidence of the purchase of that ring? A. Well, it was just charged to me as platinum. In fact, I think they wanted to try out this particular type of work, and I don't think it was sold to me except as platinum.

Q. Do you have a record of that? A. I have a record of the amount of platinum used.

857 Q. Do you have that record with you? A. Yes.

Q. Would you mind producing the record which you have? A. This is taken from my manufacturing sheet. This is the Company that I bought, Juergens & Andersen Company, and they had the stationery, and I continued with this until I had my own stationery printed.

This is the date of April 28th, 1932. That is the time when the job was delivered to Juergens & Andersen. I do practically all my work with this one firm, although I am independent; and the ring was finished and delivered to them in 1932.

Q. Will you read from the sheet which you have before you, verbatim, the entry with which we are now 858 concerned? A. Yes, I will. The order number of Juergens & Andersen Company was No. 1205, and the man that made this ring, filed it, and assembled it, after all the work was done, is No. 16, a man that still works for me. My factory number was 473, and the amount of actual platinum in the ring when it was completed was 4 pennyweight, at a cost of $9.20; the making cost was $16 and setting cost was $6; polishing, $1, overhead $5.

Q. I don't believe you read to us exactly the line under the heading, "Article and customer"; would you mind reading that, please? A. "Mount, diamond in platinum mounting as designed."

Mr. Groner: Now, I should like to introduce as Plaintiff's Exhibit C-43 a photostat of the sheet to which the witness has referred.

* * * * * * *

Cross Examination by Mr. Flocks:

Q. Mr. Matson, I believe you stated on direct examination that you were a manufacturing jeweler? A. I did.

Q. And that you are still a manufacturing jeweler, is that correct? A. That is right. 860

Q. I am not positive whether you stated on direct examination as to the character of the work done by Juergens & Anderson, but is it true they are very high class, or an outfit of high repute in Chicago? A. Yes, sir.

Q. They do a very high grade of work? A. That is right.

Q. At the time you were with Juergens & Andersen Company a platinum ring would be made by what process? A. It would be forged from a solid piece of platinum and then sawed out.

Q. Do you still make platinum rings that way, Juergens & Andersen? A. Yes, sir.

Q. Do you make all your platinum rings that way? 861
A. Practically all.

Q. Do you make them by any other process? A. We still use the same old methods.

Q. In other words, you don't cast? A. We don't cast; never have.

Q. You don't cast gold rings? A. We cast gold rings.

Q. By what process? A. By the old, simple, melting point process.

Q. Do you use a cuttle fish process? A. Either that or sand. We use no pressure. We do very little casting; all our work is handwork.

862 *Plaintiff's Witness, G. H. Matson, Cross*

Q. This ring you stated on direct examination that Harry Radix gave you, or sold you for the cost of the metal? A. Yes.

Q. Did you know how that ring was made other than what Mr. Radix told you? A. Well, it just happened that I did, because a man who worked for Harry Radix, an experimental man I worked with at one time when I was working at the bench.

Mr. Groner: When you what?

A. When I was working at the bench, that is when I
863 was working by hand, I worked with this man in a small shop, and he used to come down and see me quite often, and told me what he was intending to do, and finally told me what he had done. For that reason I know it was done in that process, because when it came out it was what I expected to see, it had pore holes, we call them.

A platinum casting I maintained was impossible. In fact, I argued it was impossible to cast platinum.

They said, "We can do it."

I said, "Show me."

Q. Did you have occasion to purchase more rings of that character from Thomas J. Dee? A. No; that is the only one.

864 Q. Why didn't you buy more? A. Because, as I say, it was unsatisfactory. I said, "Well, what is the use, because we went to a lot of extra work to plug up these holes and fill it in." Even then it was not completely satisfactory.

Q. I notice on this sheet now identified as Exhibit C-43, that there is a charge of $16 for making under "Manufacturing Costs?" A. That is the jeweler's work of filing, and all the extra work that he had to go to in plugging up all those little holes with tiny bits of platinum wire.

Q. It would not be warranted? A. No, because my costs would be too high. That had to be done because it was a cast ring.

Q. If you would cast that ring in cuttle fish there would not be any substantial difference? A. You could not cast platinum, a platinum ring in cuttlefish.

Q. If this ring were a gold ring what would be the finishing cost? A. Probably would amount to $2.50.

Q. $2.50? A. Yes, just filing.

Q. Am I correct in understanding from your statements that you were satisfied, after buying this ring for the cost of the metal, that the process, or the ring itself, was unsatisfactory for your use in your business? A. The argument came up that the reason why it was not so 866
good was because we had to have a flat plain polished surface, and in our argument about this thing they said, "Well, we realize this is difficult casting, because you have to have this plain polished surface. But, if you cast a smaller, rounded surface, like another type of ring, it would be more practical."

I admitted it would. That is what made it so difficult, because we had to have what we call lapped polished surfaces on a square type gypsy ring, and the surface has to be perfect. Any little indentations or pores will show up readily when it is polished.

Q. Was this article the first casting you had seen? A. The first I had seen, and the first I ever heard of. 867

Q. The first you ever heard of? A. Yes, sir.

Q. Then this discussion that you had with the man that worked for Harry Radix was after? A. It was during this period.

Q. It had to do with this ring? A. It had to do with this surface he was working on.

Q. You don't remember the exact time? A. Oh, yes, it was during that year. That is how it came up. That is how they happened to do this work.

Q. That is why they gave you the ring, there was a discussion whether it was practical or not? A. Not practical, possible; I didn't think it was possible.

Q. They disclosed to you at that time the entire process, how it was made? A. They didn't disclose the process.

Q. They kept that a secret? A. Yes, sir. I didn't go into that, anyhow, because he is up on the 19th floor, and I was busy on the 8th floor.

Q. In other words, you weren't interested in the process? A. I was interested, certainly, because I am a jeweler.

Q. You didn't want to obtain it if they wanted to conceal it? A. It was none of my business.

Q. It was none of your business, and that is the way you figured it out. Who is this man you referred to? A.
869 The man I knew?

Q. Yes. A. A man by the name of Slatis.

Q. A. Slatis? A. I don't know his initials. I worked with him before I ever knew Harry Radix, a good many years ago.

Mr. Flocks: That is all.

Re-direct Examination by Mr. Groner:

Q. You spoke of the pores in this ring? A. Yes.

Q. Would pores appear in a platinum ring made any other way than by casting? A. No, they would not.

870 Q. How large were these pores? A. We would call them pin points, pin holes.

Q. Were they visible to the naked eye? A. Some of them were.

Q. Did this particular ring have projections or depressions, or undercuts? A. Underneath, yes.

Mr. Groner: That is all.

Plaintiff's Witness, Harry E. Radix, Direct 871

Re-cross Examination by Mr. Flocks:

Q. I believe you said before that you put wires in the pore holes? A. Yes; we put little points in there, we soldered them and then filed them.

* * * * * * *

Q. After you plugged up the pore holes was it necessary to chase the surface of this gypsy ring? A. It was a plain polish, plain polish.

Q. Yet there was $16 worth of work on it? A. That is the jeweler's work. My jewelers do no chasing whatever, 872
that is all done by an engraver.

* * * * * * *

Re-direct Examination by Mr. Groner:

Q. Did that $16 include the mounting of the stone and various other things? A. No.

* * * * * * *

HARRY E. RADIX, having been previously duly sworn, 873
resumed the stand, and testified further as follows:

Direct Examination (resumed) by Mr. Groner:

Q. Was there any further commercialization of the process by the Dee Company? A. Well, there might have been other transactions that I do not remember, as I did not handle all of them personally. They were handled in the regular routine work of the office.

Q. Can you point to any particular reason why the technique was not more broadly disseminated, or more widely used? A. You say "Dee." You are talking about Slatis's technique?

Q. That is right. A. Well, the jewelry trade at large did not feel, or believe, that platinum castings could be made successfully, and there were very few people in the industry who were doing the work, and if they were doing it, they probably kept it pretty much under cover.

Q. What was the condition of business at this time? A. Well, as you know, business conditions in 1931 and 1932, and those years, was very much on the decline. We were trying to recover from the wallop the country received in 1929 and 1930.

875 Q. What was the condition of the platinum market at that time? A. The platium market was very high during the good years, and if my memory serves me right, it started to decline rapidly during 1931, 1932 and 1933.

Mr. Groner: The witness is with you.

Cross Examination by Mr. Flocks:

Q. Were any of your customers dentists, dental laboratories? A. Yes; we had a large business with the dental trade, in general; that is dentists, dental laboratories and dental dealers who carry supplies for the dentists.

876 Q. Do you sell them metal? A. Yes, sir; we sell metal to the three branches of the industry; that is, dentists direct—a small percentage of our business—dental laboratories, and dental dealers, who carry the complete stock for the dentists.

Q. Do you refine any metal for the dentists and the dental trade? A. Yes.

Q. Do you refine metal for Ostby & Barton? A. No, we do nothing with Ostby & Barton, to my knowledge.

Q. You have no relations with them? A. No relations at all.

Q. I understand it would be a good account, if you had them? A. Yes; I daresay it would. It is a first-class

house, and we would be glad to sell, if we had the opportunity.

Q. Have you ever visited dental laboratories that are your customers? A. Yes, sir.

Q. Do you know how they cast metal? A. Yes, I do.

Q. You have seen centrifugal casting machines for the casting of metal? A. Yes, sir.

Q. Is Exhibit C-4 the same general type of casting machine * * * as the centrifugal casting machine you see in dental laboratories? * * * A. Yes, I would say so.

Q. They both have a rotating arm? A. Rotating vertically or horizontally.

Q. In other words, both of them are in dental laboratories? A. Yes.

Q. When did you first see a casting machine in a dental laboratory of this category? A. Well, that would be—

Q. Was it in the 20's? A. That would be very hard to answer.

Q. Before you met Mr. Slatis? A. Oh, yes, before meeting Mr. Slatis.

Q. In general, do you believe that this type of casting machine was used in the dental trade as far back as 1920? You stated on direct examination that you have been with Dee some time. I don't know whether you did business with the dental trade in 1920? A. Yes; we have done business with the dental trade all the time of my connection with the Dee Company. I did not call on the trade personally in those years, and just the exact year when the dental trade started to cast, you might say, successfully, I cannot exactly remember.

Q. In other words, you are not sure whether the inlays in your mouth, if you have any gold inlays, were cast back in 1920, if you had any inlays in 1920? A. The casting in dentistry really had its first inception during

Dr. Taggart's time. That was back a number of years. Just the exact year I do not remember at this moment.

Q. You say back a number of years. You mean in the twenties? A. I would say yes, in the twenties.

Q. In 1920? A. I would not say 1920; I would say sometime in the twenties. That is, of course, a matter of record and can be easily determined.

Q. Did you ever see the article identified by the Exhibit C-4 in use in Slatis's shop? A. No; I cannot say that I actually ever saw it in actual use.

881 Q. Isn't it true that Mr. Slatis kept his process very closely guarded, a very closely guarded secret? A. Yes, it is. He never divulged to us his exact technique and procedure from, you might say, start to finish.

Q. Did you ever make any money out of Slatis's work for the Dee Company? When I say "you" I mean Thomas J. Dee? A. No, no real money.

Q. In other words, it was a losing proposition in actual dollars and cents, I mean? A. Yes; I would say from a strictly, from a dollar and cents standard, that the Dee Company did not make any money from Slatis's connection over the period or years that he was with us.

Q. Now, on direct examination you testified in regard 882 to interchange office or departmental records. How were those records kept? A. Well, we will say the Order Filling Department would place an—

Q. In order to save time, what I have reference to, do you use a printed form? A. Not in all cases.

Q. Do you use a printed form? A. Yes, we do now. But, probably, back in those years, we just took a receipt from one department to another, on delivery.

Q. In 1931, 1930 and 1932, did you use printed forms for inter-office records? A. I would hardly think so.

Q. You don't recall precisely? A. No, not exactly. I do not.

Q. Isn't it true that you never sold a platinum casting

as a ring for full price that you should get for a ring; in other words, you always sold it for the price of the metal, if you sold any? A. That is a very peculiar question. You say, "for the full price." Just what would determine?

Q. I mean the price of the metal, plus. A. Price of the metal plus a charge for casting?

Q. A fabrication charge. A. Well, I believe the early castings that were made by Slatis, and to those concerns whose names were given you, that it is very likely that at that time we turned over those castings at, possibly, just our metal investment. 884

Q. You stated that Thomas J. Dee is in the business of selling metal. Isn't it true that Thomas J. Dee also sells equipment, such as casting machines, centrifugal casting machines? A. Yes, sir.

Q. Do they sell those to jewelers? A. We have sold casting equipment for quite some time to the dental trade. We sold what is known as a Roach casting machine.

Q. And to the jewelry trade? A. And to the jewelry trade we have, of late years, sold a casting machine which is known as the Griffin Model.

Q. When you say "in recent years," you mean after you met Mr. Jungersen? A. After I met Mr. Jungersen for the first time? 885

Q. Yes. A. Yes.

Q. When did you meet Mr. Jungersen for the first time? A. I do not remember exactly whether it was in 1932 or 1933, but it was—

Q. It was during the period of time Slatis was with Thomas J. Dee? A. That is right, during that early period.

Q. And it was after you met Mr. Jungersen that Slatis severed his connection with the Dee Company, or the Dee Company severed their connections with Slatis, or Slatis and the Dee Company parted? A. Yes; I would say that

886 *Plaintiff's Witness, Harry E. Radix, Cross*

we met Mr. Jungersen before 1936, which was the year, if I remember correctly, that Slatis's connection with the Dee Company was severed.

Q. When selling those particular types of centrifugal casting machines to the jewelry trade you know, of course, they are using it to cast jewelry? A. Yes, sir.

Q. Isn't it also true, Mr. Radix, that you have men with the Dee Company that are familiar with the jewelry casting process, and they can instruct, and do instruct your customers with the casting machine, and the casting process for manufacturing jewelry? A. We have men in our
887 research laboratory who are familiar in a general way with, of course, casting machines that we offer for sale, and the equipment that goes with it, and have a general knowledge of the casting technique, such as it is known to the industry. I mean by that, there have been in years past numerous techniques offered to the industry throughout the country by a number of men, a man by the name of Stein, and I believe a man by the name of Maxwell. * * * Of course, Mr. Jungersen and a number of so-called "home-made techniques" that every jeweler who did casting thought that he was the originator of, and so forth.

888 * * * * * * *

Q. Isn't it true, Mr. Radix, that Mr. Jungersen had casting equipment shipped to Thomas J. Dee in previous years for casting in accordance with the Jungersen process? A. I know nothing of that deal. If it happened it was made with someone else in our organization, and I had no part in the transactions, if any were made.

Q. You don't know whether that equipment is still with the Dee Company? A. I do not.

Q. Or whether it is being used today? A. I do not.

Q. In the research laboratory do you have a vacuum pump Gray Lox? A. I could not answer that question.

because I do not spend much time in the research lab. and do not know about all the equipment they have in there.

Q. Do you know a jeweler by the name of Milhening & Company, Chicago? A. Yes, sir.

Q. Did you negotiate a deal with Milhening & Company on behalf of Jungersen whereby Milhening took a license from Jungersen? A. No, I had nothing to do with that transaction, if any were made. It would be made by someone else in our organization, if made.

Q. You don't know that such a transaction was made? A. I understand that there was some kind of deal made in connection wtih a license to Milhening.

Q. Do you know that Thomas J. Dee Company received a commission for that deal? A. I do not know the particulars. If they did, as I said before, it would be handled by someone else in our organization, because I did not handle it.

Q. You don't deny that a commission was paid? A. I understand there was some kind of a deal made with Milhening.

Q. You don't deny they were paid a commission, I mean Dee were paid a commission? A. I do not deny it, but I do not confirm it, because I do not know myself.

* * * * * * *

The deposition of R. W. ERDLE, called as a witness on behalf of the plaintiff, having been first duly sworn, according to law, testified as follows:

Direct Examination by Mr. Groner:

Q. Will you state your name, age and residence, please? A. R. W. Erdle; age fifty-two; address 4940 East End Avenue, Chicago, Illinois.

Q. And what is your occupation? A. I am the president of Austenal Laboratories.

Q. What is the business of the Austenal Laboratories? A. We were in the dental business, mainly, until some few years ago, and now we manufacture dental materials, metals, and so on, and we also have a war contract, and we manufacture surgical appliances for bone surgery.

* * * * * * *

Mr. Groner: Where is the Austenal Laboratories located? A. In Chicago at 5932 Wentworth Avenue.

893 Q. Does it have any other office? A. We have a New York City office.

Q. Where? * * * A. 224 East 39th.

* * * * * * *

Q. How long have you been connected with the Austenal Laboratories? A. Ever since we incorporated.

Q. Was that prior to 1920 or, if you will, prior to 1932? A. Yes, it was.

Q. In connection with the dental work which you had, have you ever had occasion to know what a Steele's backing is? A. Yes, of course.

Q. Will you describe a Steele's backing to me? A. A
894 Steele's backing is a small metal plate with a key attached to the plate, and on to this plate fits a porcelain facing.

Q. How does the facing fit on the plate? A. The facing slides over the plate and the key engages into the porcelain body of the facing.

Q. What is the shape of the key to which you refer? A. The key has a straight part which is connected to the metal plate and away from the metal plate is a round part which is connected to the straight part.

Q. Do you have a Steele's backing with you? A. I do not. I have a reproduction of a Steele's backing with me.

Q. Will you produce the reproduction of the Steele's backing which you have? A. Here it is.

This is the Steele's backing. As a matter of fact there are two on there.

Q. What do you mean when you say you have a reproduction of a Steele's backing as contradistinguished from a Steele backing? A. Steele's backing is manufactured by the Columbus Dental Manufacturing Company, and what I have is a reproduction of one, or two Steele's backings.

Q. Manufactured by whom, do you know? A. Made by Austenal Laboratories. 896

Q. Now, referring to the denture which you have handed me, will you describe the location of the two reproduced Steele's backings therein embodied? A. Well, the Steel's backings are located at one end of the denture.

* * * * * * *

Q. Well, just to get this straight, on one side of this denture there are two Steele's backing reproductions, and on the other end of the denture, what are those lobster claws that stick out there? A. On the other end of the denture is a socket for a tube tooth.

* * * * * * * 897

Mr. Groner: I would like to introduce as Plaintiff's Exhibit C-44, the denture to which the witness has referred.

Q. Now, referring to the two Steele's backings attached to this denture, can you tell me anything about the way they were produced by Austenal? A. We bought a Steele's backing and made a rubber mold of the Steele's backing. Then we produced wax patterns which were made in the rubber mold. These wax patterns were attached to the denture, while being constructed, and later on reproduced in metal with the rest of the denture.

Q. Now, in connection with that, where did you get the idea of employing a rubber mold? A. I believe it was a Mr. Peter McGuire, who was employed with the Coe Laboratories, who told us of the procedure to make rubber molds in which to produce wax patterns for backings.

Q. Having produced the rubber mold you said you put wax in it: Would you explain to me how that was done? A. We did it in two ways, as far as I remember. We picked up some wax on a spatula and heated it and flowed the wax into the key part and over the backing part. Then
399 we used an eyedropper, picked up the molten wax and squirted the wax into the rubber mold.

Q. Referring again to the molds for a minute, what was the nature of the rubber used? A. The rubber which was used was dental rubber, which was not thoroughly cured. For that reason, it was somewhat flexible.

Q. Did the mold have under cuts? A. Yes, the mold has an under cut because it had to take in the round part of the key.

Q. Confining your answer, as far as you are able to do, to the Steele's backing reproduction, will you explain to me the steps taken after you had produced the wax replica in order to get your final backing?

400 . . . . . .

A. Oh, the wax replica had to be fitted to the denture which was being constructed.

Q. I see. A. And then the whole had to be invested with investment; the wax was eliminated.

Q. How? A. By heating up the mold and when it was heated to a certain temperature, the mold was put in a centrifugal machine, or in a casting machine, and the metal, the molten metal, was forced into the cavity which was caused by the wax part.

Q. What? A. The wax part of the denture to be constructed. I don't know how to put it in words.

Q. Will you, or can you locate for me, as well as possible, the time when you commenced employing this procedure? A. I believe I can. It was in 1932, in the fall of 1932.

Q. How do you locate that date? A. We have exchanged some letters with the New York office, in 1932, and also in the early part of 1933.

Q. I now hand you a carbon copy of a letter on two pages dated November 22nd, 1932, and addressed to R. W. Erdle, and so forth: Do you have the carbon from which that photostat was made? A. Yes, I have the carbon copy of this letter. 902

Q. Do you have the original of this letter? A. No, I do not have the original. We could not locate the original letter.

Q. Do you recall the letter? A. Yes, I do.

Q. Could you tell from whom the letter was received by you? A. Yes; from Mr. C. H. Prange.

Q. Who is Mr. C. H. Prange in New York? A. He is vice president of the Austenal Laboratories.

Q. Will you refer to page 2 of the letter, and addressing yourself to the first paragraph on that page, is the rubber mold there referred to one of the type which you have described? A. Yes, it is. 903

Q. And was it used for the purpose which you have described? A. Yes, it was, either by us or by the New York laboratory.

Mr. Groner: I should like to introduce as Plaintiff's Exhibit 45 the letter which the witness has just identified.

Q. I now hand you a photostat of another carbon copy, dated February 14, 1933, and ask you if that is another of the letters to which you have referred? A. Yes, it is.

Q. Do you have the original of that letter? A. Yes, I have.

Q. That is a true carbon copy of that letter? A. Yes, it is.

Q. And you will notice at the bottom of the second page of that letter a handwritten postscript? A. Yes.

Q. Is the handwritten postscript attached to both the original and the carbon? A. Yes, it is.

Q. Will you read the handwritten postscript, since it is very faintly impressed on this photostat; read from the original. A. "Are you still using rubber molds to make wax pattern from backings. Our waxes had trouble in that the backings seemed to be crooked, and are now waxing up to fit the facings. Naturally these facings go on with difficulty."

Q. Does that also refer to the rubber molds which you have heretofore referred to and the making of the wax replicas of the original Steele's backing? A. Yes, it does.

Mr. Groner: I should like to introduce as Plaintiff's Exhibit C-46 the photostat of the carbon copy of the letter which has just been identified by the witness.

Q. Referring to the original of the letter, and to the postscript which you have just read, can you identify the handwriting in which that postscript was written? A. Yes, I can.

Q. Whose handwriting is it written in? A. This is the handwriting of Mr. C. H. Prange.

Q. As between the original letter and the carbon copy

of the letter, Mr. Prange, in writing on his postcript used "pattern" in the original, and "patterns" in the carbon? A. Yes.

Q. Otherwise are the two postscripts identical? A. Yes.

* * * * * * * *

Q. I now hand you photostat of another carbon dated February 16, 1933, addressed to Mr. Erdle. I will ask you, first, do you have the original of that letter? A. Yes, I do.

* * * * * * * * 908

Q. From whom was that letter received by you? A. That was sent to me by Mr. Prange.

Q. Is the original signed by Mr. Prange? A. The original is signed "Carl."

Q. Is "Carl" Mr. Prange? A. Yes.

Q. Now, will you address yourself to the postscript on page 2 of that letter; does that postscript refer to the method of reproducing Steele's backings which you have heretofore described? A. Yes, it does.

Mr. Groner: I offer the photostat of the copy as Plaintiff's Exhibit C-47.

* * * * * * * * 909

Q. Now, Mr. Erdle, I call your attention to a carbon addressed to Mr. C. H. Prange, Austenal, New York, dated February 18, 1933; do you have the carbon of which this is a photostat? A. Yes, I do.

Q. Do you know who wrote the letter of which that is a carbon? A. I wrote the letter; I dictated the letter.

Q. Did you send the original, of which this is a copy, or carbon, to Mr. Prange? A. Yes, I did, or the office did.

Q. Where was the carbon which you now have before you taken from? A. The carbon was in our file in Chicago.

910 *Deposition of R. W. Erdle*

Q. Now, I should like to call your attention to the second paragraph near the top of page 1 of that letter; will you state, briefly, the background of the facts to which you there allude? A. This paragraph refers to the fact that we sent on, by parcel post, about the same time the letter was written, a rubber mold and some wax backings to the New York office. It is also stated that several more molds are being made and will be sent on, upon completion of the molds.

Q. Were molds at any time sent to Mr. Prange in New
911 York? A. This was done by the shipping department, not by the office.

There is some further comments. Do you want me to make some remarks on that?

Q. If you please. A. It is further stated in this paragraph that it is not necessary to oil the wax mold, but to simply spread the mold open and flow the wax into the key part, and then permit the wax to cool, and to remove the wax pattern by pulling it out of the mold the long way which, of course, means the direction of the key, in the direction of the key of the pattern.

It also states that if the pattern should accidentally be distorted, it could be bent back, but that this procedure is
912 probably not recommendable, because it is not accurate enough.

Mr. Groner: I would like to introduce as Plaintiff's Exhibit C-48 three pages of the carbon which the witness has identified.

Q. I now finally hand you, Mr. Erdle, a carbon copy of a letter dated September 15, 1933, and addressed to Tayreau Dental Laboratory, and so forth, and ask you if you can identify this photostat? A. Yes, I can.

Q. Will you tell us what it is? A. It is a general letter to one of our licensees in Portland, Oregon, and in the last paragraph—

Q. Excuse me, before we come to that, may I interrupt you. Who wrote that letter? A. I dictated the letter.

Q. And where did the carbon which you hold before you come from? A. This carbon came out of our files.

Q. Do you remember sending a letter like that, like that carbon, at or about the date shown on the carbon? A. There is a regular routine, as far as the letter goes, in the letter going out.

Q. Do you remember whether you signed the original of that letter? A. I most likely did, and if I did not, the secretary, who was Mrs. McGuire, probably did.

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Mr. Groner: I should like to introduce as Plaintiff's Exhibit C-49 the photostat of the letter to which the witness has referred.

Q. In connection with that letter, I direct attention to the last two paragraphs on the first page, and ask if you will explain, generally, whether those paragraphs referred to the method of making Steele's backing that you have described today? A. Yes, they do, the two paragraphs.

Q. Because the Steele's backing to which you have referred, and which is shown in Exhibit C-44, is so small, will you make a rough pencil drawing, particularly showing the cross-section of the backing? A. Yes.

915

Mr. Groner: The witness has produced three drawings on a single page headed, "A, B, C."

Q. Will you identify "A"? A. "A" is a view, a view of a backing, looking at it from the front, shall I say.

Q. From above? A. Looking at it straight.

Mr. Groner: What do you call that?

Mr. Flocks: Front elevation.

Mr. Groner: All right.

The Witness: "B" is the side elevation, and "C" is the horizontal cross-section.

916 *Deposition of R. W. Erdle*

Q. Would you mind signing and dating that? A. All right.

Mr. Groner: I should like to introduce as Plaintiff's Exhibit C-50 the free-hand drawing which the witness has just made.

The witness is with you.

Cross Examination by Mr. Flocks:

Q. Mr. Erdle, I believe you stated on direct examina-
917 tion, that the exhibit identified by C-44 is a reproduction of an original Steele's backing? A. Part of the restoration, I mean, the backing part is.

Q. The backing part is a reproduction? A. Yes.

Q. Is that what you said? A. Yes.

Q. Is it an exact reproduction, or isn't it true that it could have been touched up with a spatula in the wax form? A. This was an early denture, and while we were making these dentures, while we were making them, we had a great deal of trouble in making accurate backings, Steele's backing. It was always necessary to grind the metal part so that the porcelain facing would slide right
918 onto the backing.

Q. Isn't it true that the waxes were handled by the mechanic in the process of manufacturing the reproduction? A. Yes, it is.

Q. Did they touch up the waxes to make them the way they wanted them? A. That refers to the lingual part but the backing side of it was always protected by the porcelain facing while the waxing of the restoration was being done.

Q. I appreciate that the porcelain covers the Steele's backing. What I am asking about is, we don't have the porcelain on the Steele's backing now on this reproduction, and the Steele's backing appears to be quite rough, and does not seem to accommodate itself to a mold; it

would appear that the waxes were touched up with a spatula, and I am asking you if that is correct? A. Well, I cannot say if the backing was touched up with a spatula, but by looking at it, it is possible that some wax ran between the Steele's facing and the backing.

Q. And that was cleaned out? A. Well, as I said before, it was necessary to touch up and grind the backing in order for the porcelain facing to slide onto the metal backing.

Q. In other words, this reproduction is not a true copy of the original Steele's backing if it were touched up? A. 920
Yes; what you see there is not a true reproduction any more.

Q. In other words, this is not a true reproduction of the original Steele's backing? A. Not this particular sample.

Q. Did you make this particular sample? A. That was made in the laboratory, in our laboratory.

Q. Did you see this particular one being made? A. That is pretty difficult for me to be definite about. Maybe I did and maybe I didn't.

Q. In dental practice, with which I assume you have had considerable experience, aren't things cast from wax patterns that have been fashioned by hand, that is, formed with a spatula; for example, wasn't part of this 921
particular denture formed with a spatula and wax form? A. Most of the dentures, because they are all different, they are waxed up by hand, with the exception of backings, or facings, or possibly bars for clasps which were pre-formed either through extruding or mold process.

Q. This molding process you are talking about is making the wax in solid form and pressing it against the mold, like you take an impression of a key, or a cavity in a tooth? A. Extruding—you know what that is. The other way would be to mold it in a mold, such as I described before.

922 *Deposition of R. W. Erdle*

Q. Like pouring molten wax into a mold? A. Yes, using an eye dropper and squirting it in that way.

Q. In these letters to which you have referred, and which have been identified as Exhibits C-46, C-47, C-48 and C-49, you did not refer to the eye dropper method? A. No.

Q. Just the pouring in, or flowing in, I believe you referred to? A. I think so.

Q. If you would use the eye dropper method, would you have put that in your letter, too? A. No, not
923 necessarily, it was so common.

Q. Are you absolutely sure as to the date on which this denture was made? A. No, I am not. I can tell you it must have been the last part of 1932 or the early part of 1933.

Q. Do you have a record which identifies this particular denture? A. No, we have many cases of it where we have, where we can identify it by the doctor or delivery date.

Q. Do you have those records with you? A. No, not with me. That is how I identified this.

Q. Do your records say how the particular dentures are made? A. No.

924 Q. Then, if you had a particular denture, you would not have a record of how that particular denture was made? A. When I refer to a record, I mean the type of restoration, the date on which it was delivered and the dentist to whom it was sold, and what city it was sent to in the United States.

Q. That record does not give the process of manufacture? A. No, but it will tell whether it has a facing on it.

Q. Do you keep this process a secret in your organization? A. No, we don't.

Q. I understand that others in your organization are familiar with the practice of your technique, or they

would not be in your organization? A. What technique do you refer to?

Q. I mean, in general, in the processes which you developed in connection with the manufacture of dentures, do you caution your workmen and technicians, and research men as to telling others? Isn't it understood in your laboratories that things that are developed there and worked on there, are kept more or less confidential? A. Well, if you have a good reason for it. For instance, if you are doing development work, or if you know that somebody is going to copy the work we are doing, we are not interested, then, to show them the way we 926
do certain work, a certain type of work.

Q. Do you take patents out on developments made in your laboratory? A. Oh, yes, whatever we think it is important, we take out patents on, on development work.

Q. Will you describe the method of flowing wax into a mold? Do you melt up the wax, put it in a ladle, and pour it in? I wondered what you meant by flowing it in? A. When the technician says he flows wax, he usually means that he heats a spatula, puts on it a piece of wax, and letting the hot spatula melt part of the wax and flow on to the spatula, and then he takes the spatula and puts it either on to the model, if he 927
wants to wax the case, or he flows it into a mold, if he wants to make a pattern.

Q. Do you have the mold from which this denture identified as Exhibit C-44 was made? A. I do not think so.

* * * * * * *

Q. Do you still use this method? A. No, we don't.

Q. You have discontinued using the method? A. Yes.

Q. That you referred to in connection with Exhibit C-44? A. Yes.

Q. Why did you discontinue it? A. Because we found better ways of doing it.

Mr. Flocks: That is all.

928 *Deposition of R. W. Erdle*

Re-direct Examination by Mr. Groner:

Q. You did, as I understand it, use these reproductions produced in the way you have described in commercial dentures, did you not? A. Yes, we did.

Q. And for about how long a period did you do that? A. Approximately one year, and maybe a little longer.

Q. You disclosed the method to certain people outside your organization, didn't you? A. Yes.

Q. Did you disclose it, for example, to the Tatreau
929 Dental Laboratory? A. Yes, we did.

Mr. Groner: That is all. Thank you.

Re-cross Examination by Mr. Flocks:

Q. What is the relationship, if any, between Austenal Laboratories and Tatreau Dental Laboratory? A. * * * Tatreau Dental Laboratory have a license to use Austenal patents to produce dentures.

Q. Does Tatreau Dental Laboratory buy materials from Austenal Laboratories? A. Yes, it does.

Q. And for the particular process described in connection with Exhibit C-44? A. * * * I don't think
930 Tatreau Laboratory * * * have to buy any material from Austenal Laboratories in order to produce wax backings and the rubber molds. * * *

* * * * * * *

Q. What material does Tatreau buy from Austenal Laboratories? A. Dental porcelain, they buy molds, they buy metal, they buy investment, and they buy other dental laboratory items from us.

Q. In accordance with relations between Tatreau Dental Laboratory and Austenal Laboratories aren't Tatreau Laboratory obligated to purchase material from Austenal? A. No.

* * * * * *

Mr. Flocks:

Q. Is Tatreau Dental Laboratory obligated to Austenal Laboratories not to divulge development work and particularly techniques worked on at Austenal Laboratories? * * * A. We do not instruct Tatreau not to show his laboratory equipment, or the technique which has to do with the making of dentures.

Mr. Flocks: That is all.

Mr. Groner: Thank you, Mr. Erdle.

932

ERICH PAETZEL, called as a witness on behalf of the plaintiff, having been first duly sworn, according to law, testified as follows:

Direct Examination by Mr. Groner:

Q. State your age, name, and residence, please? A. Erich Paetzel, 37 years, 5732 South Sacramento Avenue, Chicago, Illinois.

Q. What is your occupation? A. I am a foreman.

Q. Connected with what concern? A. Austenal Lab- 933
oratories, Incorporated.

Q. Of Chicago? A. In the Chicago office.

Q. How long have you been connected with Austenal? A. Since December 4, 1928.

Q. Did the Austenal Laboratories reproduce what is known as a Steele's backing? A. Yes.

Q. Could you tell me when it commenced to do this? A. In the latter part of 1932.

Q. Can you describe exactly the process followed? A. Yes, we obtained some Steele's backings and made a rubber mold over the backing, and a wax pattern was made in that rubber mold.

Q. After your wax pattern was made, what was the

next step in making the backing? A. It was waxed up on a denture, on a model.

Q. Explain what you mean by that, will you please? A. In order to utilize the Steele's facing we had to reproduce a Steele's backing, and a model was made, a factory model was made, and the wax backing made in the rubber mold was waxed up again as this model, and then it was produced in metal.

Q. How was it reproduced in metal? A. It was reinvested, the wax burned out, and then the metal was heated with a torch and the metal was shot into the mold by centrifugal force.

Q. Now, taking up one or two steps of that process, how was the wax put in the rubber mold which you have described? A. At first we used a spatula heated over a flame, dipped into wax, and the wax poured into the rubber mold. Later on we used an eye dropper and wax was squirted into the mold.

Q How was the metal placed in the investment for the final casting? A. The mold, when the mold is burned up, there is a crucible in the mold, and the metal is melted on top of the crucible, and by centrifugal force it is forced into the sprue holes which connect the burned out mold with the crucible.

Mr. Groner: The witness is with you.

Cross Examination by Mr. Flocks:

Q. Have you any records of the process which you have just described? A. No, sir; only my memory.

The deposition of CHARLES HENRY PRANGE, a witness called on behalf of the plaintiff, having been first duly sworn, testified as follows:

Direct Examination by Mr. Groner:

Q1. Will you state your age and your residence? A. I am 50 years old, and I live in Short Hills, New Jersey.

Q2. What is your occupation? A. I am Vice President of Austenal Laboratories, Inc.

Q3. How long have you been connected with the Austenal Laboratories, Inc.? A. Since its incorporation in 1928. 938

Q4. What is the business generally of Austenal? A. Our principal business is dentures and dental alloys.

Q5. In connection with your work having to do with dentures, did you ever have occasion to use what is known as a Steele's backing? A. Yes, we have.

Q6. Will you explain briefly what a Steele's backing is? A. A Steele's backing is a metal piece, which is used to retain a porcelain facing. The metal piece has a ribbed projection on it, which interlocks with a correspondingly shaped recess on the back of the facing, and the facing is slid on end-wise over this rib, and then is cemented in place by the dentist.

Q7. Just by way of description, would it be fair to say 939 that, speaking broadly, the shape of a Steele's backing somewhat resembled, particularly in cross-section, a segment of railroad rail? A. Yes, that is approximately the shape of it. The proportion is a little different, but the shape is similar.

Q8. It has a flat base? A. Yes.

Q9. And a central longitudinal piece rising from that at an angle of 90 degrees? A. That is correct.

Q10. And then it has this rounded flange on its outer extremity? A. That is correct.

Q11. I hand you Plaintiff's Exhibit C-44, which has

940 *Deposition of Charles Henry Prange*

heretofore been introduced in this case, and ask if it contains a Steele's backing of the type you have referred to? A. Yes, it does.

Q12. Does it contain one or more than one? A. Two.

Q13. I also hand you an original drawing, signed R. W. Erdle, April 22, 1942, which has heretofore been introduced herein as Plaintiff's Exhibit C-50, and ask if that is a fair representation of the backing to which you have referred? A. Yes, that is substantially correct.

Q14. When did your company commence using these Steele's backings? A. We have been using them some
941 time, I should say in 1930 or 1931—that is, for this particular purpose. We used gold backings prior to that, as every dental laboratory does. We began using them on a commercial basis, that is, in the regular course of our business, at this particular time, we began using them in June of 1932.

Q15. Did you make these or did you purchase them? A. We made them.

Q16. How did you make them? A. Well, our first method of making them was to use the porcelain facing itself as a mold and to pour wax into it, let it chill, and then to slide off the porcelain facing, which left a shape
942 of a backing. However, that is not a satisfactory way of doing it, because it allows no clearance to provide for the manufacturing variations in the facings. They won't be interchangeable. The standard manufactured backing is smaller than the recess in the facing, in order to provide that tolerance. And so, subsequently to that, we developed a way to duplicate the commercial backing, so that we would have that clearance to permit the facing to slide on more easily.

Q17. When did you develop this new technique? A. Well, sometime in 1932.

Q18. What was the technique? A. Well, the technique was to take a standard precious metal backing, and to

mount it in a flask, a vulcanizing flask we call it; and then to pack in rubber. We used dental rubber at the time, not having anything else readily available. And then to vulcanize it to the extent that it would still remain elastic. And then we would strip it off from the pattern.

Q19. How did you strip it off? A. Well, there is nothing to hold it on particularly, except the slight undercut on this flange that you just described a while ago, and the rubber being yielding, of course you can stretch it enough to pull it right off in spite of the undercut which is on there. 944

Q20. Just proceed, please. A. We had a mold made out of elastic rubber with a cavity in it accurately reproducing the shape of the commercial Steele's backing, and we filled that cavity with wax, allowed it to cool off and harden, and then by stretching the mold, it was possible to disengage it despite of these undercuts, and take it out, and use it in connection with the making of a denture. In the making of a denture, of course, a wax pattern is made of the denture as it is finally to be constructed. Do you want me to go through all that procedure of making a denture?

Q21. Yes, please. A. This wax pattern is invested in refractory material, and after the refractory material has set, the wax is burned out by heat, leaving a cavity, which exactly reproduces the shape of the original wax pattern, and then this mold is placed in a casting machine, which is usually one of two types—either a centrifugal casting machine or a pressure type casting machine—and the metal is melted in an adjacent small crucible, and then, after it is melted, either by air pressure or centrifugal force, the metal is forced into the mold, filling the mold cavity, it freezes, and then the investment is taken apart, and the finished casting is taken out. I should have said the casting is taken out, because there 945

are polishing operations on the casting normally. It is not quite finished.

Q22. How was the wax used to make the wax replica, put into the rubber mold, that you have described? A. Why, our first way of doing it was just to place it in the cavity with a so-called wax spatula; but when we came to making them in somewhat greater quantity, we began to use a little glass eyedropper, and we would slightly distend the mold so as to open up that cavity for the flange and flow the wax into that cavity, then fill up the whole mold cavity with wax, then allow it to freeze.

947 Q23. Have you made an effort to find for me a Steele's backing made by you during this period? A. A wax one or a metal one?

Q24. A metal one? A. Yes, I did look around some.

Q25. Were you able to find one? A. No, I did not.

Q26. Have you made an effort to find any of the rubber molds used by you? A. Yes, we did. But the rubber, of course, after the passage of years, hardened up, and we undoubtedly threw that away some years ago.

Q27. Have you made an effort to find any of the wax replicas of the Steele's backings which were used by you at this time? A. No, I have not; they are so fragile

948 that it is not at all likely we would have them.

Q28. You have not found one, in any event? A. No, we have not.

Q29. Have you made any effort to find any of the flasks used by you to make the rubber molds? A. Yes, we have. We found five or six of them.

Q30. You have some of those here? A. Yes, I have two of them right here.

Q31. Will you produce them? A. Yes (witness produces).

Q32. Mr. Prange, will you take one of those flasks which you have produced here today, and describe it as well as you are able to, please, sir? A. The flask con-

sists of a flat base, and on this base we took a standard precious metal backing and mounted it by soldering it on with some kind of solder; and then we arranged an enclosure around that metal pattern.

Q33. A circular enclosure? Just describe one. A. Yes, a circular enclosure, the function of which was to retain the rubber while we were packing the rubber into the flask.

Q34. About how wide is that enclosure? A. It looks like about an inch in diameter.

Q35. And about how deep is it? A. Oh, a quarter of an inch. 950

Q36. Will you proceed? A. And the rest of the flask consisted of another flat plate, which fitted on top of the rest of the assembly, and it is arranged for two bolts to go all the way through the whole assembly; and the way we used it was to pack this soft uncured rubber into this circular cavity, leaving a certain amount of excess, and then we assembled the flask, and screwed down the nuts on the bolts in order to bring the parts together and squeeze out the excess of rubber which we had in there, in order to make sure that the flask was entirely filled with rubber. Then it was placed in a vulcanizer for a given length of time, and the rubber was cured until it attained an elastic condition. After that, the flask was taken apart, and the rubber was stripped off from the original pattern, and then it was ready for use. 951

Q37. And the mold thus made was of about what size? A. This mold was about an inch in diameter, and possibly a quarter of an inch thick.

Q38. What was its condition with relation to hardness? A. It was elastic.

Q39. Has that flask been in the possession of Austenal since it was made? A. Yes, it has been.

Q40. Can you state about how long you manufactured Steele's backings, according to this method? A. I would

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say it was somewhere around a year; it may have been a little over or it may have been a little less; but approximately a year, I should say.

Mr. Groner: I introduce as Plaintiff's Exhibit N.Y.-23, the flask which the witness has just identified, which consists of two parts, together with two bolts and two nuts.

(Offered in evidence and marked Plaintiff's Exhibit No. N.Y.-23.)

953 Q41. Now, referring to the flask which you have just identified, I notice on the interior of the ring some adherent material. Can you tell me what that is? A. Yes, that is some of the rubber. You see, it is still elastic to some degree.

Q42. Was that torn off in withdrawing the mold from the flask? A. Yes, we had to use a separating medium to keep the rubber from sticking to the metal, and in this case apparently they did not entirely get the metal covered with the separating medium, and it stuck so tightly in this place, that this little piece of rubber was torn out and remained in the flask.

954 Q43. Now, will you address yourself to the second flask which is now before you? A. Well, this flask is substantially the same as the first, except that the shape of the cavity is a little different and a little larger. The principal reason for that, I should say, is because it is a bigger pattern we have in here. The first one was quite a small one. Otherwise it is of substantially the same construction and was used in substantially the same way.

Q44. Will you describe it enough so that the two may be separately identified or distinguished? A. This has a rectangular flat plate and on that flat plate we mounted a precious metal, commercial type of Steele's backing, again with some kind of solder; and then we had another section consisting of a flat plate, which fits over the first flat plate, and has some elongated opening in it, and this

elongated opening provides a retaining enclosure for the rubber, and of course defines the outside contour of the rubber mold. And then the third part, again, consists of a flat plate, and there are two bolts that go through the whole assembly, which are used for closing the flask when the rubber is packed into it, and which are used for holding it together while the rubber is being vulcanized.

Q45. Is it used in the same way as the other flask which you have described? A. Yes, it is used in the same way.

Mr. Groner: I should like to introduce as Plaintiff's Exhibit N.Y.-24 the flask just identified by the witness. 956

(Offered in evidence and marked Plaintiff's Exhibit No. N.Y.-24.)

Q46. Mr. Prange, do you continue to make Steele's backings or to use them? A. Yes, we continue using them.

Q47. Do you make them according to the method which you have described? A. No, we do not. We found another method, which was quicker, and more convenient on that account. We had one difficulty with these rubber molds; that is, the wax being oily, after you used them for a certain length of time, it caused a swelling of the rubber, and that interfered with the accuracy of the molds; and so had to constantly re-make them. If we had the synthetic rubbers we have nowadays, we would not have had that trouble. 957

Q48. Did you have, during this period, certain correspondence dealing with this general system of making Steele's backings? A. Well, I remember seeing in the files some references in letters passing between myself and Mr. Erdle, of Chicago, and I have also seen one letter which was written by Mr. Erdle to one of our licensees, which describes a method of making this rubber mold.

Q49. I hand you now carbon copy of a letter dated November 22, 1932, and addressed to Mr. R. W. Erdle, Austenal Laboratories, Inc., 6033 Wentworth Avenue, Chicago, Ill., not signed, but bearing the letters on the second page in the lower left-hand part of the writing, "CHP:AG." I also hand you a photostat, which has heretofore been introduced in evidence as Plaintiff's Exhibit C-45, and I ask you first if the photostat is a true photostat of the carbon copy which I hand you? A. It appears to be identical as far as I can see.

959 Q50. Now, addressing yourself to the carbon, can you identify that carbon? A. Yes, that is a carbon copy of a letter which I wrote to Mr. Erdle under the date which appears at the head. These initials at the end of it are mine, and "A. B." are the initials of my stenographer at that time, who is still in the employ of our company.

Q51. Do you remember actually sending a letter of that nature to Mr. Erdle? A. Yes, I do.

Q52. Will you refer to the second page of the letter and to the third paragraph on the second page? A. Yes.

Q53. And explain whether you were there referring to phases of the system which you have described for making Steele's backings? A. Yes, I was referring to that

960 system.

Q54. Is there anything you might say in explanation of the paragraph to which I have referred you? A. Yes; evidently this mold was not quite accurate, and that was the reason that I wrote to Mr. Erdle about it, and my theory appears to have been that the mold was too thin, and that therefore it did not have enough stability that it would retain its shape. I suggest in this paragraph that he should send us one which is thicker.

Q55. Could you state whether at the time of this letter you were actually using the rubber mold in the manufacture of Steele's backings? A. Yes, we certainly were using it. To what extent, I do not know. But we were using it at that time.

Q56. And was your use a commercial use? A. Yes, we were making dentures at that time for our customers, and many of these dentures had to have backings on them for Steele's facings, and we undoubtedly used some of these in making these dentures.

Q57. Is the article, Plaintiff's Exhibit C-44, to which I have heretofore referred you, a typical or representative denture such as you have been speaking of? A. Yes, it is. These Steele's facings are used quite a bit in all dental laboratories.

Q58. I now hand you an original letter on the letterhead of Austenal Laboratories, Inc., in two pages, dated 962
February 14, 1933, together with a carbon copy of a letter on yellow paper in two pages, dated February 14, 1933, and addressed to Mr. Erdle, and a 2-page photostat of a letter, dated February 14, 1933, and addressed to Mr. Erdle, the photostat having heretofore been introduced herein as Plaintiff's Exhibit C-46. I wish you would examine the original and the carbon, first, and tell me whether the carbon is a carbon copy of the original letter which you hold in your hand? A. Yes, it is a carbon copy, except for the postscript, which is in longhand.

Q59. Is the postscript of the original letter in your 963
handwriting? A. Yes, it is.

Q60. Is there a longhand postscript to the carbon copy? A. Yes, there is.

Q61. Is it in your handwriting? A. Yes, it is.

Q62. Now, will you refer to the photostat, and tell me whether it is a true photostat of the carbon copy? A. Yes, I say it is identical.

Q63. Now, referring again to the carbon copy and to the original letter, and referring to the longhand postscript, will you make comparison between them and tell me whether they are in all respects identical? A. I can see two differences. It does not seem to have the same

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number of words on every line, although the wording throughout is alike, except that I see the word "pattern" is singular in one case and plural in the other.

Q64. In which case is it singular and in which case is it plural? A. It is singular on the original and it is plural on the carbon copy.

Q65. Which did you intend to write? A. Well, it should have been plural, because it makes better sense that way. We did not make just one wax pattern; we made more than one; so it should have been plural.

965 Q66. Does the omission of the "s" in the word "pattern," affect the sense of the postscript? A. I would not think so.

Q67. I now hand you a photostat and ask you if you can identify it? A. This is a photostat of the second page of my letter of February 14, 1933.

Q68. When you say your letter, do you mean the original as contradistinguished from the carbon copy? A. Yes, it is a photostatic copy of the original of the second page of my letter to Mr. Erdle of February 14, 1933.

Mr. Groner: I should like to introduce as Plaintiff's Exhibit N.Y.-25 this photostat, from which a small block of material beneath the words "Austenal Laboratories, Inc.," and above any of the typewritten part of the letter has been removed.

966 (Offered in evidence and marked Plaintiff's Exhibit No. N.Y.-25.)

Q69. Referring now to the longhand postscript appearing on the second page of the letter to which you have referred, and appearing on the single page, Plaintiff's Exhibit N.Y.-25, will you explain the meaning of the postscript, and to what you referred therein? A. Well, the meaning of that was that this method of using rubber molds to make wax patterns for backings was originated at our Chicago plant, and they started to use them.

before we did, and recommended them to our use, and we apparently had some difficulty in using them on account of inaccuracy of the patterns, and I wrote to Mr. Erdle on that account, in order to get further information.

Q70. Now, referring again to that longhand postscript and to the fourth line and the fourth word of that line, will you tell me what that word is? A. The word "now."

Q71. It is not the word "not," is it? A. No, it is "now"—n-o-w.

Q72. I now hand you what appears to be an original letter on the letterhead of Austenal Laboratories, Inc., dated February 16, 1933, addressed to Mr. R. W. Erdle, and so forth, and signed "Carl." I also hand you a two-page carbon of a letter dated February 16, 1933, addressed to Mr. Erdle, and so forth, unsigned, but bearing the initials to the left of the place where a signature would go, "CHP:M." I also hand you a photostat of a letter in two pages, dated February 16, 1933, addressed to Mr. R. W. Erdle, bearing no signature, but the letters to the left of where the signature would go "CHP:M," and ask you if you will state, first, whether the carbon is a carbon of the original letter which you hold in your hand? A. Yes, it is a carbon copy of the original letter. 968 969

Q73. Now, will you refer to the photostat, and tell me whether it is a photostat of the carbon? A. Yes, that is a photostat of the carbon.

Q74. Do you know who wrote that letter? A. I wrote the letter.

Q75. Is that your signature to the original? A. Yes, that is my signature.

Q76. And those are your initials to the left of the signature? A. That is correct.

Q77. Do you remember writing this letter? A. Yes, I do.

Q78. Will you refer to the second page and to the post-

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script appearing near the bottom of the second page and tell me whether that postscript refers to a phase of the method which you have described for reproducing Steele's backings? A. Yes, it does.

Q79. Now, reverting for the moment to the letter of February 14, 1933, about which you have testified, I am not sure I asked you whether the photostat which has been introduced in evidence as Plaintiff's Exhibit C-46, is a true photostat of the carbon, and whether the carbon is a true carbon of the original. Will you look at those?

971 A. Yes, this is a carbon of the original, except for the longhand postscript. The longhand postscript was written in by me in both cases.

Q80. Was the original letter written by you? A. Yes, the original letter was written by me.

Q81. Does it bear your signature? A. Yes, it does.

Q82. Now, I hand you a photostat bearing the words at the top, "Mr. R. W. Erdle, February 16, 1933, page 2," signed "Carl," and bearing the initials opposite the signature "CHP," and ask if you can identify the page which I now hand you? A. This is a photostatic copy of the second page of a letter which I wrote to Mr. Erdle on February 16, 1933.

972 Q83. Now, is that letter of February 16, 1933, the letter about which you have testified here today? A. Yes.

Q84. Or one of the letters? A. Yes, it is.

Mr. Groner: I introduce photostat of the single page, being page 2, of Mr. Prange's letter to Mr. Erdle of February 16, 1933, as Plaintiff's Exhibit N.Y.-26.

(Offered in evidence and marked Plaintiff's Exhibit No. N.Y.-26.)

Q85. I now hand you, Mr. Prange, a carbon in two pages, the first page being written on both sides, dated February 18, 1933, addressed to Mr. C. H. Prange, Aus-

tenal, N. Y.; and at the same time I hand you a photostat in three pages, the first page being dated February 18, 1933, addressed to Mr. C. H. Prange, Austenal, N. Y.; and ask if you can identify the carbon which I hand you? A. This is a carbon copy of a letter sent to me by Mr. Erdle.

Q86. Do you remember receiving such a letter? A. Yes.

Q87. Have you made an effort to find the original? A. I have made some effort, not very much, but I did not find it.

Q88. You recognize, however, that the carbon is the carbon of a letter which you actually received? A. Yes, indeed, I remember some of the other things in here which were subject of correspondence at that time. 974

Q88a. Now, will you examine the 3-page photostat against the carbon, and tell me whether the photostat is a photostat of the carbon which you hold? A. Yes, these three pages of the photostat are the same as the three sides of the carbon copy.

Q89. Will you now address yourself to the second paragraph on page 1 of the carbon which you hold in your hand, and tell me the substance of that paragraph? A. By this paragraph Mr. Erdle sent from Chicago a rubber mold and some backings. He says the rubber molds are not very good, but that several of them are being made and when completed they will be sent on to us. They had a vulcanizing outfit in Chicago, and they made all the rubber molds there at that time, in the beginning. Then, later on, we made them ourselves; but in the very beginning they made them for us. That is why this correspondence came about. 975

Q90. Do you remember receiving from Mr. Erdle at or about the time of this letter, any rubber molds? A. Yes, we did.

Q91. Were these rubber molds to be used in practicing the process of reproducing dentures? A. Yes, we were

reproducing dentures at New York just the same as they were in Chicago, and we had to supply Steele's backings, and so we were faced with exactly the same situation.

Q93. I hand you a carbon copy of a letter dated September 15, 1933, and addressed to Tatreau Dental Laboratory, the letter being in two pages, the second page being written on the back of the first, and signed "Austenal Laboratories, Inc.," with the small letters opposite to the left of the signature "rwem," and ask you if you
977 had knowledge of this particular letter at or about the time shown by the date at the top of the letter? A. I do not know. I may have received a carbon copy of it. I very often did. I know who Tatreau is. He is one of our licensees. Of course the initials at the end of it are Mr. Erdle's; and "m" stands for Mrs. McGuire's name, who was his stenographer at the time.

Q94. You, however, do not specifically remember having received a copy of that letter at or about that date? A. No, I do not.

Mr. Groner: The witness is with you, Mr. Flocks.

978 *Cross Examination by Mr. Flocks:*

XQ95. I believe you testified on direct examination, Mr. Prange, that you began to use this process that you described in connection with a rubber mold, in 1932; is that correct? A. Yes, we did.

XQ96. And you were making your own rubber molds in 1932? A. That I could not say for certain. They started making the rubber molds first in Chicago, and then later on we made them ourselves in New York. Exactly when we started to make them, I could not say.

XQ97. You could not say definitely, then, that you made them in 1932? A. No. I know we used the backings,

but whether the molds were made in New York or Chicago at that precise time, I do not know.

XQ98. Then, if on direct examination you said you made these rubber molds in 1931 and 1932, that is not accurate, is it? A. Well, when you say "you," I think of ourselves as a company, and it is the same company in New York and Chicago. As a corporation, as an organization, we did make them in 1932.

XQ99. Referring to Plaintiff's Exhibit C-46 and Plaintiff's Exhibit N. Y.-25, will you please read the second 980
sentence of the postscript, first, on Exhibit N. Y.-25, and then on Exhibit No. C-46? Please read them to the reporter. A. (Reading) "Are you still using rubber molds to make wax pattern for backings? Our waxers had trouble in that the backings seemed to be crooked and are now waxing up to fit the facing. Naturally these facings go on with difficulty."

XQ100. Will you read the second sentence of the postscript on Exhibit C-46? A. (Reading) "Our waxers had trouble in that the backings seemed to be crooked and are now waxing up to fit the facing."

XQ101. Read the next sentence on the same exhibit. A. (Reading) "Naturally these facings go on with difficulty." 981

XQ102. Would it not, Mr. Prange, make more sense if the word before "waxing" in line 4 of each postscript, be read as the word "not," because the postscript says that the waxers had trouble with the backings which were crooked, and accordingly would there not be more sense to the postscript if it were read to state that the waxing did not fit the facing because the waxers were having trouble with the backings which seemed to be crooked? A. No, that would not make any sense at all. The sense is exactly expressed by what I say here.

XQ103. Well, if the backings were crooked, would the wax fit the facing? A. There are two different things here. Waxing up to fit the facing is a different process from making a pre-formed wax pattern.

XQ104. Is every Steele's backing like every other Steele's backing? A. No; they are made in a variety of sizes. But the interlocking part is interchangeable with all facings. It is a standard manufactured part.

XQ105. Is it not true, Mr. Prange, that in the dental profession, as well as the practice you follow in your
983 laboratory, the back part of the Steele's backing is always different, depending on the mouth of the user? A. It differs in size but the part that engages with the facing is always the same.

XQ106. I am referring to the back part of the Steele's backing. A. It is different in size. It is always flat, but it is different in size.

XQ107. I hand you Exhibit C-44, and ask you if the back of the Steele's backings which you have referred to on this particular exhibit—I ask you if these backs are identical on the two? A. No, they are not identical.

XQ108. Are they the same size? A. No.

XQ109. They are different sizes? A. That is correct.

984 XQ110. And outside of the fact that they are different sizes, they are identical, is that correct? A. What do you mean by "identical"?

XQ111. Are they identical in every respect with the exception of size? A. In a general sense they are; they are both flat surfaces.

XQ112. You mean on the inside they are flat surfaces. What about on the back (rear face) of the base? A. No, the rear face of the base is not the same.

XQ113. Is the rear part of the base part of the Steele's backing? A. No, it practically never is any part of use of Steele's backings.

XQ114. Is the rear part of the base made of the same

kind of metal that the remainder of the Steele's backing is made of? A. I do not know whether you are talking generally or not. The usual thing is to buy ready-made Steele's backings. They are usually made out of precious metal, and those are cut to shape in the dental laboratory, and they wax up to the back of them and cast against them.

XQ115. When you say they wax up to the back of them, you mean wax is added? A. Yes, to the back side of them. The front side cannot be modified, or it will not fit the facing. 986

Mr. Groner: For the sake of the record, may I ask the question: Is a facing the tooth itself, Mr. Prange?

The Witness: I guess you would call it a tooth. It is a facing, just exactly what the phrase says.

* * * * * * *

By Mr. Flocks:

XQ116. Then, is it not true, Mr. Prange, that the Exhibit C-44, or that part of C-44 which you have referred to as the two Steele's backings, and that part which is made of metal, are not replicas of the pattern to which you referred earlier; and I have reference to the back side of the back of the Steele's backings? A. As far as the back side of the back of the Steele's backings are concerned, they are not replicas, no. 987

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XQ122. Mr. Prange, is it not true that in the process which you have described, the waxes which come out of the mold do not correspond to the cavity wherein the metal is cast by the processes you have referred to? A. No, that is not entirely true. They do correspond to the part which engages with the facing.

XQ123. What I mean is with the entire cavity in the metal mold cavity? A. You say a wax replica does not correspond?

XQ124. In other words, Mr. Prange, is it not true that wax is added to the wax that comes out of the mold in the process which you have described? A. Only on the back side. You cannot add it to the front side without destroying the accuracy. The front side is the side that fits the facing.

XQ125. Then, is it not true that the metal casting is not a replica of the wax that is removed from the wax making mold? A. It is a replica as far as the front face is concerned which engages with the facing. The back
989 part of it is not a replica.

XQ125a. Then, is it not true that the entire casting is not a replica of the wax to which you have referred? A. The entire casting is not a replica of the wax pattern which we made in our rubber mold.

XQ126. Is it not true in all cases of the manufacture of Steele's backings in the process to which you have alluded? A. You refer to our use of our process?

XQ127. Yes. A. That statement I just made applies.

XQ128. Have you any record of the process to which you have alluded, Mr. Prange, any written records? A. The written records we have are the ones that have been introduced here.

990 XQ129. I mean aside from the correspondence to which you have referred? A. No, I have not been able to find any written record.

XQ130. Is it not a practice, Mr. Prange, in your laboratory, to keep records of your work? A. Not as much as I would like to see it done.

* * * * * * * * *

XQ132. Do you take out any patents, Mr. Prange? A. Yes, I do.

XQ133. Is it not customary in your laboratory to keep records in connection with patents? A. It is customary in our experimental department. These were done in

our production department, and they seldom keep records there. Our experimental department does keep records.

XQ134. This was not done in your experimental department? A. No, this was done in our production department.

XQ135. How many rooms does your production department comprise? * * * A. In 1932 and 1933 our production department consisted of three rooms.

XQ137. Did you follow substantially the same practices, so far as you know, that were followed by the Chicago office or part of the organization of Austenal Laboratories? A. In what respect? 992.

XQ138. With regard to giving detailed information as to materials and techniques used? A. That is of such a general nature that I just cannot answer that question.

XQ139. When did you first see the molds identified by the Exhibits Nos. N. Y.-23 and N. Y.-24?

Mr. Groner: They are not molds, and were not introduced as such.

Mr. Flocks: Strike "molds" and substitute "exhibits."

A. When did I first see these particular ones?

XQ140. Yes. A. I could not tell you. We have about 993
a half dozen of these in our shop right now, and I have seen some of them, and others I have not seen. I could not distinguish between these and the others that we have on hand.

XQ141. You have no record of when you first saw them? A. Well, I certainly saw these moulds at the time we were using them.

XQ142. And when was that, Mr. Prange? A. Well, it was either the end of 1932 or the beginning of 1933 that we began using these particular molds. Pardon me, there is a little confusion of terms. They have just ob-

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jected to the use of the term "molds." These are not molds; these are flasks.

XQ143. You are referring to Plaintiff's Exhibit N. Y.-23 and Plaintiff's Exhibit N. Y.-24? A. Yes; as part of a group of molds, I say we have about half a dozen of them on hand now.

Mr. Flocks: That is all.

Re-direct Examination by Mr. Groner:

995 RDQ144. Mr. Prange, just see if we can eliminate some of my friend's confusion. When did Austenal Laboratories, to the best of your knowledge, either in New York or in Chicago, commence the use of the method which you have testified to today for reproducing Steele's backings? * * * A. It was on or before the date of this first letter which was introduced, November 19, 1932—is it not?

RDQ145. November 22, 1932, referring to Plaintiff's Exhibit C-45. A. It was on or before that time.

RDQ146. Which was the first office to adopt this practice? A. Chicago.

996 RDQ147. Did Chicago communicate the practice to New York? A. Yes, it did.

RDQ148. Did you have personal knowledge of the process? A. Yes, I did.

RDQ149. Did you—and by "you" I mean the New York office of Austenal—at the inception manufacture your own rubber molds? A. No, they were first made at Chicago.

RDQ150. Did Chicago send you rubber molds? A. Yes, they did.

RDQ151. Did you employ the rubber molds in the manufacture of the process which you have described? A. Yes, we did.

RDQ152. Can you locate, as nearly as possible, the date when you first employed the rubber molds, irrespective of whether you made the rubber molds or not? A. Well, it was at the time of the date of that first letter of November, 1932. The letter definitely shows it.

RDQ153. Did you witness the process being practiced in your laboratory in New York? A. Yes, I did.

RDQ154. Now, there has been some testimony with regard to the base or the rear face of the base of the backings. Are the backings made as a standard article of manufacture? A. You said are the backings made? 998

RDQ155. Yes. A. Are you speaking of commercial backings or the ones that we make?

RDQ156. Commercial backings. A. Commercial backings are a standard article of manufacture made in a variety of sizes, and the difference in the sizes relating to the back plate principally. Otherwise the cross-sectional dimensions of that rib and flange are always identical.

RDQ157. Why is it necessary in various cases to alter the base of the backing? A. Well, that is just to accommodate to the individual conditions in the mouth. Sometimes the upper teeth come down very closely over the lower teeth and we have only very little space there. 999 You see, the lower teeth bite against the back side of the upper teeth, and it depends upon the jaw relations, the relations between the upper and lower teeth. The back part of it is commonly waxed up to correspond with the contour of the patient's remaining natural teeth.

Mr. Groner: That is all.

(Witness excused.)

1000 *Plaintiff's Witness, Eric Zahn, Direct*

ERIC ZAHN, a witness called on behalf of the plaintiff, having been first duly sworn, testified as follows:

Direct Examination by Mr. Groner:

Q1. Will you state your age and residence, Mr. Zahn? A. Age, 35; residence, Poundridge, Westchester County, New York.

Q2. What is your occupation? A. Plant Superintendent.

Q3. Where? A. Austenal Laboratories.

1001 Q4. How long have you been connected with Austenal Laboratories? A. Since 1928.

Q5. Have you had occasion in the performance of your duties to reproduce or witness the reproduction of what is known as Steele's backings? A. I have.

Q6. Can you state when you first learned of any method of reproducing such backings? A. When we started developing our Vitallium casting technique.

Q7. And when was that, Mr. Zahn? A. I think it was the end of 1931; around 1931 anyway.

Q8. Can you explain the method which was employed by you in this work? A. We started out by simply taking a Steele's facing, which is a porcelain veneer.

1002 Q9. Is that a false tooth? A. It is a false tooth; yes, in the form of a false tooth. Then we flowed in wax into the key portion of the facing.

Q10. Will you explain in a little more detail what you mean by the key portion? A. That is a negative roll and neck portion embedded in a false tooth. These faces are considered interchangeable.

Q11. Do you mean by that, that they all have a keyway or slot in their rear face? A. The rear facing has approximately the same dimensions and the roll and neck portions, they vary in size, however.

Q12. Do you mean by that that the teeth vary in size? A. Naturally, there are all kinds of incisors and posterior

teeth and variations in facings roughly correspond to variations in the size of teeth in the human being.

Q13. In other words, you are reproducing teeth to go into different human beings, and you necessarily have to have different teeth in order to reproduce the removed teeth? A. That is right. I might add that facings are used particularly wherever a close bite condition exists in the patient's mouth.

Q14. Now, Mr. Zahn, you have testified that when you commenced reproducing Steele's backings, you first flowed wax into the keyway on the rear side of these various teeth. I understood you to say—and I will ask you if I 1004
am correct—that the keyway itself was in all cases identical? A. That is correct.

Q15. Did you thereafter adopt another method than flowing the wax into the keyway on the false tooth? A. Yes, we did. At the end of 1931 we used a tool which was called a backing plier. This backing plier had a recess in one side and a flat surface in the other, on the other side of the jaw. To use this tool, the base plate wax was warmed up so it became plastic. It was put in between the two jaws of the plier, and the plier was squeezed together. This formed wax backing. This backing, however, was not quite accurate, and usually 1005
warped on being removed from the recessed portion of the backing plier.

Q16. Because of this difficulty, did you devise another means of making the wax replica? A. I did not, but Mr. Erdle, of Chicago, did. We started adopting the Chicago method, the method developed in Chicago—

Q17. About what time? A. I am a little hazy on that; I imagine it was the summer of 1932, but I would not swear to that.

Q18. Did you have personal knowledge of this method which had been developed by Mr. Erdle? A. Naturally, I had, because I worked on production of this particular

item at that time, the producing of Vitallium dentures at that time.

Q19. Would you mind stating what that method was? A. We bought a standard gold backing, turned out by the Columbus Dental Company. Those backings came in various sizes. This backing was mounted on a block of steel—or steel plate, rather. This steel plate had a frame around the lower base and two screws were anchored into this base.

Q20. Without or within the frame to which you re-
1007 ferred? A. On the outside of the frame. There was an opposing steel block or a cover with two or more holes, these holes lining up with the screws on the base. The frame and the mounted gold backing, formed a cavity, and in this cavity we vulcanized soft rubber.

Q21. What was the purpose of vulcanizing the soft rubber? A. We wanted to form a negative backing.

Q22. Do you mean by that what is usually known as a mold? A. Correct.

Q23. And was the apparatus which you have described in which this mould was formed, generally known as a flask? A. Correct.

Q24. Now, when you commenced using this process of
1008 which you now tell us, did you make your molds or did you receive them already made? A. We made those molds up in our New York shop, since we had to make up a multitude of molds. As far as I remember, approximately ten were required, due to the variations in the size of the facings.

Q25. You said "due to the variations in the size of the facings." What effect did the size of the facings have on the Steele's backings? A. It simply did not pay—it is a little hard to explain right now. You have extreme variations in the size of teeth; the lower sizes are very narrow and the upper sizes are very broad; and it would not be practical to make the same size of backing to ac-

commodate each size of facing. So, in order to approximate a condition, you have the various sizes of backings to harmonize with the sizes of facings which are standard.

Q26. Now, would you describe what a Steele's backing consists of? A. A Steele's backing is a plate with a neck and roll portion.

Q27. Is the roll portion in effect a flange extending along the outer edge of the neck? A. It is cylindrical in shape; I would not call it a flange.

Q28. Now, did the cylindrical portion or the neck portion vary as between different backings? A. The roll portion is considerably larger than the neck portion. Reversing this condition in a porcelain tooth, we have a considerable undercut in the porcelain facing.

Q29. As between two or three or ten Steele's backings, is the neck part and the roll part the same size in all of them, or is it a different size? A. There are certain tolerances which are required. Offhand, I do not know; but they vary around 1/1000; they are all, within 1/1000, the same. They are considered interchangeable.

Q30. Do the bases of the Steele's backings vary? A. The size of base varies, as I explained before.

Q31. Would you go on with your explanation? I am sorry to have interruped you so much. You have created the rubber mold, as I recall. A. This rubber mold was only partially cured, because we were getting a lot more flexibility by effecting a partial cure. I believe the curing time was half an hour, if I am not mistaken. After the mold was cured, it was removed from the flask and was ready for use. Do you want me to explain the use?

Q32. I would like you to explain exactly what it was used for, and why you used rubber? A. In order to produce an accurate wax backing from this mold, we heated wax in a small vessel to the melting point. This wax was sucked up with an eye dropper by dilating the mold and pointing the nozzle of the eye dropper into the cylindrical

portion of the mold. We injected wax into this existing cavity.

Q33. After this what did you do? A. We allowed the wax to cool to attain sufficient rigidity. In order to speed the cooling we ordinarily put it into a vessel with cold water, which made the wax rather hard and brittle. The wax backing was then removed by stretching the neck portion of the rubber mold, allowing us to extract the backing from the mold.

Q34. Could you have extracted the wax copy of the
1013 backing from the mold without stretching the mold? A. No, that would have been impossible, because the neck portion is fairly delicate, and the roll is about twice the diameter of the neck.

Q35. I hand you a photostat of an original exhibit heretofore introduced herein as Plaintiff's Exhibit C-50, and ask if you can identify the figures A, B and C, as different views of a Steele's backing? A. Yes; Figure A is an anterior view; Figure B a lateral view; and Figure C is simply a cross-section through a backing.

Q36. Now, referring to Figure C, I hand you a pencil and ask you if you will mark with the figure I the base of the backing to which you referred, and with the figure
1014 II the neck of the backing to which you have referred, and with figure III the cylindrical or roll portion to which you have referred. A. Yes (witness marks).

Mr. Groner: The witness has made the marks which I requested of him.

I should like to introduce as Plaintiff's Exhibit N. Y.-27 the photostat of the Exhibit C-50, to which the witness has added the figures in Roman numerals, I, II and III, with a directing line in each case.

(Offered in evidence and marked Plaintiff's Exhibit N. Y.-27.)

Q37. Now, Mr. Zahn, I believe your last statement concerning the process had to do with the withdrawal of the wax duplicate from the mold. After the duplicate was withdrawn, what was the next step in the process which you described? A. The wax backing was placed over the porcelain facing. The wax backing, however, extended over the periphery of the porcelain facing. This excess was trimmed off with a heated wax spatula.

Q38. May I interrupt there? You placed the backing in the keyway in the tooth in order to observe what part of the base of the backing was beyond the artistic needs of reproduction, is that correct? A. That is correct. 1016

Q39. And you trimmed away whatever was not needed in the base or the part designated as I of Figure C? A. That is correct.

Q40. Of Plaintiff's Exhibit N. Y.-27? A. That is correct. However, sometimes part of the keyway, or the roll and neck portion of the backing had also to be trimmed away. The lower portion of the backing is usually referred to as a gingival portion.

Q41. Referring to drawing B of Plaintiff's Exhibit N. Y.-27, will you indicate by the letter IV the part of the neck and roll portion sometimes trimmed away? A. Yes (witness marks). 1017

Mr. Groner: The witness has indicated with the Roman numeral IV.

Q42. Did you make that last alteration in the case where you were dealing with a short tooth? A. Yes, it would invariably be done with a short tooth, a short facing was used.

Q43. And when you were dealing with a normal sized tooth, was it necessary to alter? A. Sometimes to various degrees. It depended on the case.

Q44. And with a large tooth, was it necessary? A. Almost in all cases there is some slight excess which has to be trimmed.

Q45. Now, having trimmed that excess, what was the next step which you took? A. A combination of wax backing and porcelain facing was placed in a plaster matrix or index.

Q46. How was it so placed? A. The labial portion of the facing was placed in a corresponding surface of the matrix. This matrix has a purpose of locating the facing and backing in exact relationship to the existing teeth in the patient's jaw.

Q47. What did you then do, Mr. Zahn? A. The wax backing was then tied to the rest of the wax pattern.

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Q48. You mean the rest of the wax pattern, being the pattern of the denture being prepared? A. Of the denture, yes—by the expedient of flushing wax between the extension bar of the denture and the wax backing on the other end. As a rule, the lingual anatomical landmarks common on human teeth were reproduced on the lingual side of the backing in the wax pattern.

Q49. Do you mean by that that you made the rear side of the backing conform to the patient's mouth; do you not? A. That is correct.

Q50. Then what was your next step, Mr. Zahn? A. The wax pattern was then sprued up; that is, it was

1020 provided with casting gates. The next step was to reinvest, or invest the wax pattern, using a refractory material.

Q51. Will you explain what you mean by "to invest the wax pattern"? A. It was embedded in a refractory material.

Q52. After the investment was completed, what was your next step? A. The "investment," as it is commonly called, was placed in a preheating furnace, in order to eliminate the wax.

Q53. How was this elimination accomplished? A. By simply raising the temperature above the burning point of the wax. The wax thus was completely eliminated before casting.

Q54. Now, after the elimination of the wax, what was the nature of the investment? A. Well, the investment withstood extremely high temperatures, and in the case of dentures it was necessary to introduce a mold expansion in order to compensate for the shrinkage of the metal.

Q55. Now, what I meant was, after your investment is complete and after the wax had been burned out, was there a cavity in your hardened material? A. Yes, a cavity corresponded to the configuration of the wax pattern.

1022

Q56. Then, what was your next step, Mr. Zahn? A. The mold was then taken out of the preheating oven.

Q57. What was taken out from the preheating oven? A. The mold or investment. The investment was placed in a centrifugal casting machine, which had a crucible for the melting of the casting alloy. The spout of the crucible lined up with the casting channel in the investment. The metal was then preheated with an oxyacetylene blow torch. After the metal was molten, a tension spring was released spinning the casting machine around, thus forcing the metal from the crucible into the investment cavity. After the metal had solidified, the case was removed from the casting machine.

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Q58. When you speak of the case, do you mean the investment? A. The investment; it was then removed from the casting machine. The investment or refractory material was removed from the casting, and the case was then ready for the final finishing.

Mr. Groner: The witness is yours.

Cross Examination by Mr. Flocks:

XQ59. Mr. Zahn, did you keep a notebook on the steps of this process at the time that you allege you were performing this process? A. No, I did not.

1024 *Plaintiff's Witness, Albert W. Merrick, Direct*

XQ60. And you have no record now of this process? A. No.

(Witness excused.)

ALBERT W. MERRICK, a witness called on behalf of the plaintiff, having been first duly sworn, testified as follows:

1025 *Direct Examination by Mr. Groner:*

Q1. How old are you, and where do you live, Mr. Merrick? A. I am 50, and I live at Ossining, R. D. 2, five miles out from Ossining, New York.

Q2. What is your occupation, Mr. Merrick? A. I am a Metallurgist.

Q3. Are you connected with any concern? A. I am employed by Austenal Laboratories.

Q4. In New York City? A. In New York City.

Q5. How long have you been employed by Austenal? A. Since November 13, 1933.

Q6. When you were employed was Austenal engaged in the business, among others, of reproducing what is known
1026 as a Steele's backing? A. Yes.

Q7. Will you explain how they did reproduce these backings? A. They had a rubber mold which was the negative of the backing that was desired to be produced, and that mold was filled in by flushing with wax, molten wax.

Q8. How did they flush it? A. With an eye dropper. They used to have a pan of molten wax and squirted it in with the eye dropper. That was levelled off on the top surface and allowed to cool, and then through the flexibility of the mold you could open it and free the wax object from it, or the wax pattern from it.

Q9. Was the wax pattern a replica of the original backing? A. Yes.

Q10. What did you then do with the wax? A. Well, that was incorporated in the construction of a denture, a cast metallic denture, where the construction called for the use of what is known as a Steele's facing tooth.

Q11. Having incorporated the wax in the balance of the denture, what did you then do? A. By incorporating it in the balance of the denture, that means that the balance of the denture is wax, and this is on a dental model, and then it is reinvested.

Q12. How is this done? A. In detail?

Q13. Broadly, first. A. Well, by pouring a mass around it, a ceramic mass around it that sets; and then when that is sufficiently dried, it is put into a furnace. 1028

Q14. Is that mass, after setting, known as an investment? A. That is right.

Q15. Now, go ahead. A. Then this mold or investment, when it is sufficiently dried, is placed in a furnace and is slowly heated, further dried to melt out the wax and bring it up to a proper casting temperature, and it is removed and placed in a centrifugal machine and cast with some dental alloy. In this case it was Vitallium.

Cross Examination by Mr. Flocks:

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XQ16. I believe you stated that you were a Metallurgist? A. That is right.

XQ17. Did you go to work with Austenal in connection with metallurgy? A. That is right.

XQ18. Did you develop the alloy known as Vitallium?

Mr. Groner: I object to that. That has nothing to do with this interrogation. Are you going to ask whether it is a precious metal?

Mr. Flocks: I will, if it is satisfactory to you.

Mr. Groner: It does not make any difference to me. I just want to keep this on the track. We will stipulate that it is not.

1030 *Deposition of Raymond E. Ostby*

The Witness: That is right, it is not.

Mr. Flocks: Will you read the question I asked?
(Last question repeated as recorded.)

A. I will have to answer no to that.

XQ19. Did you assist in the development of Vitallium? A. Yes.

XQ20. Did you do this work at the Austenal Laboratory to which you have just referred in your last answer? A. Yes.

1031 Mr. Flocks: That is all.

Re-direct Examination by Mr. Groner:

RDQ21. Did Austenal sometimes make the rubber molds to which you referred? A. That is a question that I cannot answer. I assume that they did. I was purely interested in the process and happened to be acquainted with it because of my interest, that is all.

Re-cross Examination by Mr. Flocks:

RXQ22. Do you have any written records of this
1032 process, Mr. Merrick, that you made yourself? A. No.

The deposition of RAYMOND E. OSTBY, having been duly sworn, deposes and testifies as follows:

Direct Examination by Mr. Flocks:

Q1. Will you state your name, age, and occupation, Mr. Ostby? A. Raymond E. Ostby; 60 years old; manufacturing jeweler, I suppose you would term it.

Q2. How long have you been associated with Ostby &

Barton? A. I think it is since 1909. I am not sure whether it was 1909 or 1910. It is back in there somewhere.

Q3. During this period of your association with Ostby & Barton, what have been your duties? A. First I was assistant superintendent and then superintendent.

Q4. Are you an officer of the corporation of Ostby & Barton? A. I am not.

Q5. Have you ever been an officer? A. No.

Q6. During your association with Ostby & Barton you were first assistant superintendent and now you are superintendent; is that correct? A. Yes.

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Q7. When did the change from assistant superintendent to superintendent take place? A. I just don't know, because I was assistant to my uncle, who was officially superintendent, but more or less in name. I have really been superintendent since I have been there, but I was assistant to my uncle who finally got completely out about 10 or 15 years ago. It was one of those family things—there wasn't any real change.

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Q18. Mr. Harald Ostby, who was president up until 1939, as you remember it * * * withdrew from the presidency and you say became chairman of the board of directors? A. Yes.

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Q21. Is Mr. Harald Ostby now chairman of the board of directors? A. He is.

Q22. Then Mr. Harald Ostby has been chairman of the board of directors from 1939, as you recollect it? A. Yes.

* * * * * * * *

Q28. In your capacity as superintendent and assistant superintendent, did your work have to do with production? A. Yes.

Q29. What does Ostby & Barton produce? A. They produce rings practically entirely.

Q30. You mean jewelry, Mr. Ostby? A. Yes, finger rings, so-called.

Q31. Such as gold rings? A. They start from brass, silver, and then up to gold.

Q32. Do you make any platinum rings? A. No.

Q33. Do you make any platinum jewelry besides rings? A. No, we do not handle platinum at all, except little bits of trimmings, tops to solder onto mountings, but not platinum jewelry, just a few little things to apply to gold to set a diamond in, for instance.

1037 Q34. Do you have occasion, Mr. Ostby, in your capacity as superintendent or assistant superintendent, to consider the purchase of jewelry for re-sale by Ostby & Barton? A. No.

Q35. Is Ostby & Barton, insofar as you know, strictly a manufacturing concern? A. Yes.

* * * * * * *

Q46. In your capacity with the firm of Ostby & Barton as assistant superintendent and superintendent, do you have occasion to supervise the production of parts in rings and other jewelry? A. Yes, sir.

Q47. Are you familiar with the manufacture of these things by the use of dies in a stamping process? A. Yes,
1038 sir.

Q48. Are you familiar, insofar as the work done by Ostby & Barton is concerned, with the manufacture of these things by hand, that is, with a saw and file and hand tools? A. Yes, I could not do it myself but I am familiar with it.

Q49. Insofar as the production of Ostby & Barton is concerned, are you familiar with the cuttle fish process? A. We have never used any cuttle fish, to my knowledge.

Q50. Do you know what it is? A. I know roughly what it is but not intimately.

Q51. Insofar as Ostby & Barton is concerned, there isn't any cuttle fish process used? A. No.

Q52. Are you familiar with the admitted casting process in the present suit? A. Yes.

* * * * * * * *

Q55. Then we may summarize—the rings you have so far made in manufacture of jewelry at Ostby & Barton have been manufactured by one: stamping by the use of dies; and two: * * * the admitted casting process. * * * Are there any other processes that you, in your capacity as assistant superintendent and superintendent of Ostby & Barton know were used in the manufacture of jewelry? * * * You may limit your reply to when you started with 1040
Ostby & Barton or some time approximating that time up until March, 1941. A. No.

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Q62. Then, Mr. Ostby, we may say that so far as the handmade type of ring and the cuttle fish process are concerned, those two processes of making rings are not used by Ostby & Barton? A. That is right.

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Q69. Then is it correct to say that there are two departments for production in Ostby & Barton, one: the stamping department; and Two, the admitted casting department? A. Yes. 1041

Q70. Are you familiar with both of those departments? A. Yes.

Q71. Did your work relate to both of those departments, in so far as they existed from the period beginning with your employment by Ostby & Barton until March, 1941? A. Yes, sir.

Q72. Which was the first department set up, in so far as you know, Mr. Ostby? A. Stamping.

* * * * * * * *

Q77. You were familiar with the work done in the casting department as you have stated, and is it correct

to say that the work done in the casting department is the process which is admitted in the paper referred to? A. Substantially.

Q78. How does it differ, Mr. Ostby? A. There are just minor differences. In here it states that we are using a pressure casting of the metal. We use both the air pressure method and the centrifugal.

* * * * * * * * *

Q81. The admitted process in the paper is what was used up until March, 1941? A. Yes, sir.

1043 Q82. In step A of the admitted process, Mr. Ostby, reference is made to a metal mold which is built up around a master pattern? A. Yes, sir.

Q83. It is also stated that this metal mold comprises from three to five pieces? A. Yes, sir.

Q84. Are you familiar with any molds which are made in so far as item A is concerned of more than five pieces? A. I don't think I am familiar enough to know whether there might be six in some of them. I will say that I am not familiar enough with the thing to know whether there are more or not.

Q85. What are these metal molds made out of, in so far as you know, Mr. Ostby? A. It is some kind of

1044 a soft alloy. I just don't know the composition of the alloy.

Q86. Are you familiar with the melting temperatures of the metal used? A. In these molds?

Q87. Yes. A. I am not.

Q88. Do you know whether it is a low temperature melting metal? A. I think it is, but I am not positive. I think it is. I know it is not a brass type of high melting temperature.

* * * * * * * * *

Q92. With regard to step b, Mr. Ostby, after the mold of part A has been made and the master pattern re-

moved, melted wax is squirted into the mold? A. Yes, sir.

. . . . . .

Q94. In your casting department, Mr. Ostby, was there more than one mold which was used for the reception of wax? A. For different rings, there are different molds.

. . . . . .

Q97. Were any of those molds to which you have just referred made of material other than the metal to which you have referred? A. No, sir.

Q98. Were any of these molds into which the wax 1046
was introduced made of rubber? A. No, sir.

Q99. Then all the molds were made of metal? A. Yes, sir.

Q100. As acting superintendent and superintendent, Mr. Ostby, no doubt it was your duty, and if I am not correct, please correct me, to supervise both the stamping department and the casting department? A. Yes, sir.

Q101. In the organization of Ostby & Barton and under you, is there someone in charge of the casting department and someone in charge of the stamping department? A. Yes. 1047

Q102. Who is in charge of the stamping department and who is in charge of the casting department? A. Joseph Jacobs is in charge of the stamping department and Leon Gossett is in charge of the casting department.

. . . . . .

Q106. What is the title of Leon Gossett? A. He is the foreman of the casting department.

. . . . . .

Q109. How long have you known Mr. Gossett? A. I think 10 to 12 years, somewhere in there. I am not quite

sure when he came in there, but I think it was about 10 years ago. I am not sure of the date.

Q110. When Mr. Gossett came with you, in what department was he employed? A. He was employed as a pattern maker, a designer, you might call him.

Q111. When Mr. Gossett came with you, he was not in the casting department? A. No.

Q112. There was no casting department? A. No, there was no casting department.

Q113. You said that Mr. Gossett was a designer; in other words, when samples were made up, I assume that
1049 he had to make the samples? A. That is right.

* * * * * * *

Q115. Do you know if Mr. Gossett was a skilled designer? A. We thought he was or we would not have hired him.

Q116. When he was employed initially by Ostby & Barton, were his duties to make the original designs? A. Yes.

Q117. And after the designs were made—

* * * * * * *

Q124. Do you know Mr. Thoger Gronberg Jungerson?
1050 A. Is that this Mr. Jungerson?

Q125. Yes. A. Yes, surely.

Q126. Do you know Mr. Jungerson's son? A. I have met him.

Q127. Thoger Gronberg Jungerson, Junior? A. I imagine that is his name. Mr. Jungerson's son came in with him.

Q128. When did you first meet Mr. Jungerson? A. I wouldn't know. It was some time in the thirties, but just when it was, I couldn't tell you. I never kept any dates of his coming in and going out. He was in quite a few times to see me.

Q129. Do you know how he came to meet you? A.

To the best of my knowledge and belief he just came in and asked for me or asked for somebody—I don't know whether he asked for me or not, but I was the fellow that finally saw him and talked to him. Whether he asked for me or was referred to me, I don't know.

Q130. What was the nature of your talk with him? A. He wanted to put us into a casting proposition that he had, sell us a casting proposition.

Q131. Did you consider the casting proposition? A. I don't think we did at the time. We were principally a stamping house and we were not interested right off the bat in casting because that was a different method of manufacturing and we were not interested. We are interested in anything that is in the line of making rings and we are willing to talk with anyone who comes in with a proposition to put up to us.

Q132. Then this casting proposition, as you term it, that Mr. Jungerson came in with, had to do with rings and jewelry? A. Yes.

Q133. At that time you had no casting department, is that correct? A. Yes, sir.

Q134. Do you recall, Mr. Ostby, who was present at the time of your initial meeting with Mr. Jungerson that you have referred to? A. I don't recall whether I was alone or whether there was somebody else there.

Q135. Was this proposition of Mr. Jungerson when he came to Ostby & Barton initially of any interest to Ostby & Barton? A. Yes, anything is of interest to Ostby & Barton that has to do with the making of rings.

Q136. Then you listened to Mr. Jungerson's proposition and it was of some interest, but as Ostby & Barton were primarily a stamping house, nothing definite came out of the proposition? A. Not at that particular time, no.

Q137. When did something definite come out of it? A. I couldn't tell you the time. I just don't know.

1054 *Deposition of Raymond E. Ostby*

Q138. It was sometime subsequent to your first meeting with Mr. Jungerson? A. Yes.

Q139. This casting proposition that Mr. Jungerson proposed to Ostby & Barton is related to the admitted process, is it not? A. Yes, sir.

. . . . . .

Q141. Where was Mr. Jungerson's first meeting with you held?

. . . . . .

1055 A. As far as I can recollect, it was held in our main office, some part of the main office.

Q142. In order to provoke this interest that you have referred to, did Mr. Jungerson discuss his proposition with you?

Mr. Cunningham: Objected to. How can he know what was in Mr. Jungerson's mind?

Why don't you ask him what Mr. Jungerson did?

Q143. Did what Mr. Jungerson showed you at the first meeting interest you? A. Yes.

Q144. Did you take this matter up with others? A.
1056 I imagine I did.

Q145. Who were the others? A. I imagine I would take it up with Mr. Dixon. I might have mentioned it to my brother Harald.

Q146. Does Ostby & Barton make ladies' rings? A. Yes, sir.

Q147. Did they make ladies' rings prior to March, 1941? A. Yes, sir.

Q148. Did they make ladies' rings prior to 1935? A. Yes, sir.

Q149. Have they always made ladies' rings? A. For the last 60 years.

Q150. Are you familiar with the ladies' rings made by Ostby & Barton? A. Yes, sir.

Q151. In addition to making ladies' rings, do you make gentlemen's rings? A. Yes.

Q152. Does that cover the same period? A. Yes, sir.

ROYAL J. GREGG, having been duly sworn, deposes and testifies as follows: 1058

Direct Examination by Mr. Flocks:

Q1. Will you state your name, age, and occupation? A. Royal J. Gregg; 63; president of Ostby & Barton.

Q2. How long have you been with Ostby & Barton? A. Since 1906, January.

Q3. When did you become president of the firm? A. May, 1939.

Q4. What was your title prior to May, 1939? A. I was secretary and treasurer prior to that.

Q5. Back to 1906? A. No, I was elected secretary in 1928 and I was elected treasurer in 1935.

Q6. In what capacity did you start with Ostby & Barton? 1059 A. Accountant.

Q7. Were you engaged in general accounting practice prior to that time? A. That was about my first job. I did work with a firm of accountants for about six months prior to going to Ostby & Barton.

Q8. Who was president of the Ostby & Barton Company before you were? A. Harald W. Ostby.

Q9. In what capacity is Mr. Harald Ostby associated with the firm? A. At the present time he is chairman of the board of directors.

Q10. And has he been chairman of the board of directors since 1939? A. Since May, 1939.

Q11. Who was chairman of the board of directors before Mr. Harald Ostby? A. Mr. Nathan B. Barton.

Q12. Is Mr. Barton now associated with the firm? A. He is deceased.

Q13. Will you state generally what your duties are as president? A. I am the executive manager.

Q14. And as executive manager, do you have to do with production and sales? A. In an executive capacity. I have men under me, of course, that head those departments.

1061 Q15. Who is the head of manufacturing? A. Raymond Ostby is the active superintendent.

Q16. Who is the head of sales? A. At the present time we have no sales manager.

Q17. Do you act in that capacity? A. I am acting in that capacity now, yes, sir.

Q18. How long has that been so? A. For about two months, less than two months.

Q19. Who was the head of sales prior to that time? A. William J. Richards. Just prior to that I took on a new man by the name of Edward Phelps. I took him on in June of 1943 and released him in January, 1944.

Q20. Prior to Mr. Phelps, you had a Mr. Richards? A.
1062 Yes, Mr. Richards died December 1, 1942.

Q21. How long was he with the company? A. About 26 years, I believe.

Q22. And he headed the sales department during that period? A. No, he was a salesman in the New York office up until about—we moved him to Providence about 1935, I should say, and he became sales manager in 1940.

Q23. He was moved to Providence, as you say, in 1935? A. Yes, sir.

Q24. He was in sales? A. He was a salesman in the New York office prior to that time.

Q25. When he moved to Providence he was in sales out

of Providence? A. In the sales department, that is right. He continued as a salesman right along.

Q26. What is the nature of the business of Ostby & Barton? A. The manufacturing principally of gold and silver rings.

Q27. In general, by what methods does it manufacture? A. Largely die struck rings.

Q28. Do you have a casting department? A. We do.

Q29. When I refer to the admitted casting process, I am referring to the casting process admitted by the plaintiff, Ostby & Barton, in this suit, in its particulars * * * I would like for you to examine the admitted process. 1064

* * * * * * *

Q32. I am only relating my questions to the time period which ends in March, 1941. Does Ostby & Barton have a casting department which performs this admitted process? A. Yes.

Q33. And is this casting department in production? A. Yes.

Q34. When was that department started, Mr. Gregg? A. I cannot say definitely.

Q35. Do you know Thoger Gronberg Jungerson? A. Is this the gentleman (indicates defendant)? 1065

Q36. The gentleman sitting on my right in this room. A. I have met him, yes.

Q37. When did you first meet him? A. Approximately 5 or 6 years ago.

Q38. Were you president of the firm at that time? A. I was not.

Q39. That was before you were president? A. Yes.

Q40. Do you remember who else was present at that meeting? A. I do not.

1066 *Plaintiff's Witness, Royal J. Greyg, Direct*

Q41. Do you remember where the meeting was held? A. In our office.

Q42. At Ostby & Barton's office? A. Yes.

Q43. Do you remember in which room the meeting was held? A. The salesroom, the sales office.

Q44. Is that sometimes called the conference room? A. No.

* * * * * * *

Q54. Are you familiar with the rings made and sold by Ostby & Barton? A. Yes.

1067 Q55. I hand you a photostatic copy of the catalog of Sears-Roebuck & Company for the spring and summer of 1941, and I turn to page 419 and ask you if any of those rings are Ostby & Barton rings? A. I cannot pick out our individual rings.

Q56. Did you sell any rings about that time to Sears-Roebuck? A. We did.

Q57. I hand you the catalogs for the fall and winter of 1936-1939, and for the fall and winter of 1940-41, and I will ask you if you can pick out any rings manufactured by Ostby & Barton? A. No, I cannot.

Q58. Did Ostby & Barton have a casting department prior to your meeting with Mr. Jungerson? A. I believe
1068 we did some casting, yes.

Q59. And the casting process in the casting department is the admitted casting process? A. I cannot say definitely on that.

* * * * * * *

Plaintiff's Witness, Alfred E. Dixon, Direct 1069

ALFRED E. DIXON, having been duly sworn, deposes and testifies as follows:

Direct Examination by Mr. Flocks:

Q1. Will you state your name, age, and occupation? A. My name is Alfred E. Dixon, 47 years old. I am in charge of the designing at Ostby & Barton.

Q2. How long have you been with Ostby & Barton? A. I have been with Ostby and Barton 31 years.

Q3. How long have you been the designer for Ostby & Barton? A. About 10 years.

Q4. What were you before then? A. I was in the pricing department, costing department. I was in the main office—all clerical work. 1070

Q5. Was there a big change about 10 years ago in your duties? A. No, I was assistant to the designer. I worked with him 2 or 3 years before that. I just eased into it.

Q6. You had to do with the designing 12 or 13 years? A. I had to do with making the designs, yes.

Q7. Are you familiar with the stamping and casting departments at Ostby & Barton? A. Yes.

Q8. Who is in charge of the casting department? A. In charge of the casting department? 1071

Q9. Yes. A. We have a man up there who does the work. I don't know whether you would call him in charge or not. He is the man who does the work.

Q10. What is his name? A. Leon Gossett. I supervise him.

. . . . . .

Q15. "From a design point of view, and I am asking this question of you as a designer, are there more possibilities for different designs in manufacture in the casting department?" A. I should say not.

Q16. Are there less possibilities? A. I don't see your point there, but I will say this: that you can get just as

1072 *Plaintiff's Witness, Alfred E. Dixon, Direct.*

much designability in stamping as you can in casting. Does that answer your question?

Q17. That is your answer. In your supervision of the man in charge of the casting department, are you familiar with the process used in the casting department? A. I could not do it. * * * I am familiar with it in a general way. As I said before, I am in charge of the designing. The workman knows the process which he uses in casting. I give him the rings to work on. I spend very little time in the factory.

1073 Q18. Are you familiar with the admitted casting process, that is the process which the plaintiff, Ostby & Barton, admits that it is using in its casting department?

I hand you a copy of the plaintiff's particulars wherein it sets forth the steps of its admitted process as a, b, c, and so on.

* * * * * * *

A. I believe in general that is the way we are using it.

* * * * * * *

Q22. How many types of molds are made in the casting department of Ostby & Barton which molds are used 1074 for the introduction of wax therein? A. How many kinds?

Q23. Kinds or types? A. We use whatever is here (witness indicates paper).

Mr. Flocks: The witness is pointing to the typewritten paragraph entitled "Step a."

Q24. In that paragraph Step a it refers to a metal mold comprising from three to five parts * * * what are those three to five pieces made of? A. They are made of metal.

Q27. Were they made of anything else besides metal? A. No.

Q28. Were they made of rubber? A. We don't use rubber.

Q29. Do you use a rubber-like material? A. No.

Q30. Do you use a flexible material? A. We use this metal just as it says here.

Q31. Do you know what metal it is? A. No, I do not.

Q32. Is it any special type of metal? A. I don't know. It is a metal. There may be records around but I don't know the composition of it.

Q33. Do you know Mr. Thoger Gronberg Jungerson who is sitting on my right? A. I have met the gentleman.

Q34. When did you meet him first? A. I couldn't say. I have met him several times.

Q35. Where? A. At Ostby & Barton's.

Q36. Did you meet him before you became designer there? A. I can't swear to that. I don't know the date I first met him.

Q37. When you met him were you the designer for Ostby & Barton? A. I don't know that. I don't know when he first came here.

Q38. What was the subject of the meeting with Mr. Jungerson initially, the initial meeting? A. I don't even know that I was at the first meeting.

Q39. At your first meeting with Mr. Jungerson, you said that you had a first meeting with him, and I assume that that meeting was between you and him and possibly others, so at that meeting— A. I presume he had some system which he was expounding, some method of casting.

Q40. Was that of any interest to you or to Ostby & Barton, in so far as you were representing Ostby & Barton? A. As I remember, at the time there was a depression on and I think we were running rather low. We didn't have too much help and we didn't have too

1078 *Plaintiff's Witness, Alfred E. Bixon, Direct*

much money. I don't think we were particularly interested. We were not expanding. We were coasting along at a pretty low ebb.

Q41. Nothing was done about it at that time, at the initial meeting? A. Not to my knowledge.

Q42. Then at that time your casting department was not in existence, is that correct? A. When he first came?

Q43. Yes. A. I should say not. I would not swear to it but I should say not.

Q44. Then the casting department came into existence after your first meeting with Mr. Jungerson? A. Probably.

1079

Q45. Did you have more than one meeting with Mr. Jungerson? A. I have met him two or three times.

Q46. Were those meetings a week apart or a month apart, or a year apart? A. I wouldn't say. I don't keep a diary, but they were not a week apart. I am sure that it was longer than that.

Q47. Where were these meetings held at Ostby & Barton? A. In the sales office.

Q48. Do you know how much time you spent, was it an hour or a minute or an hour and a half? A. I should say a short time.

1080 Q49. How short is "a short time"? Was it 5 minutes or an hour? A. I wouldn't say. It was several years ago—probably half an hour, might have been 15 minutes. It certainly was not hours.

Q50. Were these meetings friendly meetings? A. As far as I was concerned.

Q51. Do you remember who was present at any of those meetings? A. Mr. Raymond Ostby was present at one meeting.

Q52. At a meeting at which you were present? A. Yes.

Q53. Do you know Mr. Jungerson's son, Thoger Gronberg Jungerson, Junior? A. I have met him.

Plaintiff's Witness, Alfred E. Dixon, Direct

Q54. You met him at one of those meetings? A. Yes.

Q55. Did you meet him at more than one meeting? A. I don't recollect. I remember of meeting him once, anyway.

Q56. Was this casting process that as you say Mr. Jungerson expounded related to the admitted casting process? A. I don't recall, frankly. The only thing I do recall was his showing some mountings which he brought along with him.

Q57. Were they cast mountings? A. He said they were.

Q58. Were they of any interest? A. They were. I would not put them in our line, necessarily. They were rings.

Q59. You are speaking from a designing point of view? A. Yes, from a designing point of view.

. . . . . .

Q61. Are you familiar with the Ostby & Barton ring designs? A. Yes.

. . . . . .

1084 **Stipulation of Contents of Record on Appeals.**

It is hereby stipulated between counsel for the plaintiffs and defendant that the record on appeal in connection with the respective appeals by both parties shall include the following:

1. Docket Entries
2. Complaint
3. Amendment to Complaint
4. Answer and Counterclaim

1085 5. Reply to Counterclaim

6. Defendant's Motion for Particulars—Paragraph B only
7. Plaintiff's Particulars
8. Opinion—Judge Meaney
9. Findings of Fact and Conclusions of Law
10. Order and Stipulation re Exhibits and Further Stipulation.
11. Final Judgment
12. Ostby and Barton's Notice of Appeal

1086

13. Jungersen's Notice of Appeal
14. Testimony before the Court
15. Slatis-Dee and Austenal Chicago Depositions (Part of Exhibit P-2)
16. Austenal-New York Depositions (Part of Exhibit P-10)
17. Ostby and Barton—Providence Depositions (Exhibit D-3)
18. Exhibits as hereafter noted.

19. This stipulation

20. Order extending time to file record

21. Order re file wrapper

22. Stipulation Waiving Certification

23. Clerk's Certificate

EXHIBITS ON APPEAL

PLAINTIFFS'

1088

P- 1 Certified copy file wrapper patent in suit and references

PHYSICAL

P- 2 Photographs, being Exhibits C-1, C-3, C-7; C-13, C-19, C-24, C-30, C-41, C-42 and C-43 of the Slatis-Dee Depositions

P- 8 Dental plate—Steel's backing (C-44) PHY.

P- 9 Letters:

Prange to Erdle	11/22/32	(C-45)
" " "	2/14/33	(C-46)
" " "	2/16/33	(C-47) 1089
Erdle to Prange	2/18/33	(C-48)
" " Tafreau	9/15/33	(C-49)
" drawing. Steele's backing		(C-50)

P-11) Austenal flasks (NY-23 and 24) PHY.
11A)

P-12 Letters:

Prange to Erdle (p. 2 only)	2/14/33	(NY-25)
Prange to Erdle (p. 2 only)	2/16/33	(NY-26)

1090 *Stipulation of Contents of Record on Appeals*

Drawing C-50 with identifying numbers (NY-27)

P-19 Plaintiffs' Patent Book:

PATENTS

Spencer No. 748,996	1/ 5/04
Kralund No. 1,238,789	9/ 4/17
McManus 1,457,040	5/29/23
Zampol No. 2,083,484	6/ 8/37
1091 Haseltine Br. No. 2467/75	
Anode Br. No. 391,230	10/27/31

PUBLICATIONS

"The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture"—
Rec'd. N. Y. Public Library
Frontispiece and pp. 86-89, 114-123.

Translation of "LaGravure, etc." by Verleye.

1092 "Diecasting Practice" by Stern, McGraw-Hill Book Company, Copyright 1930.
Frontispiece and pp. 3-20.

MISCELLANEOUS

Jungersen Br. No. 449,062

P-20 Prior Art chart
P-22 Agreement Stein and Ostby and Barton
P-23 Dixon mould PHY.
P-24 Wax patterns made in P-23 PHY.
P-25 Cluster of rings PHY.

DEFENDANT'S

D- 1	Jungersen Pat. No. 2,118,468	
D- 4	Photographs of rings	
D- 5	Photographs of rings	
D- 6	Photographs of rings	
D- 7	Toronto Evening Telegram advertisement of 12/4/33	
D- 9	Luxmoore Opinion	
D-10	Flask—sectioned	PHY.
D-11	Ring, etc., samples	PHY.
D-12	Centrifugal machine, etc.	PHY. 1094
D-13	Wax samples	PHY.
D-16	Letter Cohen and Rosenberger to Jungersen 1/10/35.	
D-17	Jungersen rings	PHY.
D-18	Identical castings	PHY.
D-19	Same as D-18	PHY.
D-20	Castings	PHY.
D-21	Same as D-20	PHY.
D-22	Cuttlefish mould	PHY.
D-23	Wax samples	PHY.
D-29	Photograph of rings	
D-30	Photograph of rings	1095
D-31	Photograph of rings	
D-32	Photograph of rings	

AND IT IS HEREBY FURTHER STIPULATED that all testimony and exhibits with respect to the Kaspar & Esh alleged prior use, mentioned in the opinion and findings of fact below are hereby withdrawn from this action in their entirety as though such testimony and such exhibits relating to the Kaspar & Esh alleged prior use had never been presented or introduced in evidence in this action.

Stipulation of Contents of Record on Appeals

AND IT IS HEREBY FURTHER STIPULATED that the record on appeal so designated above shall be printed with each party paying one-half of the cost of the printing in the first instance and such one-half so paid to be recovered as costs as may be directed by the United States Circuit Court of Appeals for the Third Circuit.

Dated: Oct. 11, 1946.

JOHN VAUGHAN GRONER,
Attorney for Plaintiffs.
COOPER, KERR & DUNHAM,
Attorneys for Defendant.

Order Extending Time for Filing Record on Appeal. 1099

It appearing that the notice of appeal of plaintiffs-appellants was filed on August 21, 1946, and the notice of appeal of defendant-appellant was filed on August 22, 1946, and therefore, unless extended, that the time for filing the record on appeal will expire on September 30, 1946;

NOW, THEREFORE, upon consideration thereof and of the below consent, it is

ORDERED that the time to file the record on appeal be, and the same hereby is, extended under Rule 73(g) of the Federal Rules of Civil Procedure for a period of 1100 fifty (50) days; that is, to and including November 19, 1946.

United States District Judge.

The foregoing order is hereby consented to:

JOHN VAUGHAN GRONER,
Attorney for Plaintiffs-Appellants.
DRURY W. COOPER, J. & C.,
Attorney for Defendant-Appellant.

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1102 **Order.**

This cause having come on on the petition of the parties hereto, and it appearing that an appeal and cross-appeal from the decree below have been filed herein respectively by the plaintiffs and by the defendant below, and that said parties under Rule 75(f). F.R.C.P. are filing a stipulated printed record herein, including therein, save as hereinafter noted, all matter which is or may be material to said appeals, and it further appearing that the file history of Jungersen Patent No. 2,118,468, designated below as Plaintiffs' Exhibit P-1, may be referred to in connection with said appeal, but that printing the same as a part of said joint record may impose upon the parties an unnecessary burden;

1103

It is ordered that said file history may be filed herein as a physical exhibit and may be referred to by the parties hereto to the same extent as though incorporated in said printed record herein.

Date: 10/7/46.

GOODRICH,
Judge, United States Circuit Court
of Appeals for the Third Circuit.

1104 Approved as to Form:

J. V. Groner,
Counsel for Plaintiffs-Appellants.
Drury W. Cooper, J. N. C.,
Counsel for Defendant-Appellant.

Stipulation of Counsel as to Correctness of the Record. 1105

It is stipulated that the foregoing and accompanying exhibit volume is a true transcript of the record of the District Court as agreed upon by the parties.

JOHN VAUGHAN GRONER,
Counsel for Plaintiffs.

DRURY W. COOPER,
Counsel for Defendant.

Clerk's Certificate. 1106

UNITED STATES DISTRICT COURT,

DISTRICT OF NEW JERSEY.

I, William H. Tallyn, Clerk of the District Court of the United States of America for the District of New Jersey do hereby certify that the foregoing together with one exhibit volume filed herewith is a true transcript of the record of the said District Court in the above-entitled matter as agreed on by the parties.

In Testimony Whereof, I have caused the seal of the said Court to be hereunto affixed, at the City of Newark, 1107 in the District of New Jersey, this day of November, in the year of our Lord one thousand nine hundred and forty-six, and of the independence of the said United States the one hundred and seventy-first.

WILLIAM H. TALLYN,
Clerk.

[fol. 370] In the United States Circuit Court of Appeals for the Third Circuit, October Term, 1946

Docket Nos. 9222 & 9223

Osby and Barton Company, and American Associates, Inc., Plaintiffs-Appellants,

vs.

Thoger Gronberg Jungersen, Defendant-Appellant

Stipulation

The parties having, under Rule 75 (f) F. R. C. P., agreed to file and docket a stipulated printed record as agreed upon, of all matter which is or may be material to said appeals, excepting from said stipulated printed record physical exhibits and Plaintiffs' Exhibit P-1, it is further

Stipulated, subject to the approval of this Court, by and between counsel for the respective parties to the above-identified appeals that certification of the said stipulated printed record by the Clerk of the United States District Court for the District of New Jersey be waived and that it will be sufficient for the Clerk of said District Court to recite in his certificate that the stipulated printed record is a transcript of the record of the District Court as agreed on by the parties.

John Vaughan Groner, Attorney for Plaintiffs-Appellants. Cooper, Kerr & Dunham, by John N. Cooper, Attorneys for Defendant-Appellant.

Dated October 24, 1946.

So ordered: Herbert F. Goodrich, Judge, United States Circuit Court of Appeals for the Third Circuit.

Dated Oct. 28, 1946.

Endorsements: Stipulation and Order for Stipulated Record. Received & Filed Oct. 28, 1946. Wm. P. Rowland, Clerk.

[fol. 371] No. 9222

Motion to Add or Substitute Ostby & Barton Co., a Rhode Island Corporation, as a Party Appellant.

Received & Filed Nov. 12, 1946. Wm. P. Rowland, Clerk.

Copy received this 8th day of November, 1946. Drury W. Cooper, Counsel for Defendant-Appellant.

[fol. 372] In the United States Circuit Court of Appeals for the Third Circuit

Docket Nos. 9222 & 9223

Ostby and Barton Company, and American Associates, Inc., Plaintiffs-Appellants,

vs.

Thoger Gronberg Jungersen, Defendant-Appellant

Motion

Come now the plaintiffs appellants in the above matter and representing to the Court that by a certain bill of sale dated the 30th day of September, 1946, a copy of which is attached hereto, marked Exhibit 1, American Associates, Inc., sold and conveyed to Ostby and Barton Company, a Rhode Island corporation located in Providence, Rhode Island, all property of its Ostby and Barton Division, including

> "all rights of the Seller as a party plaintiff in that certain action entitled Ostby and Barton Company, Plaintiff v. Thoger Gronberg Jungersen, Defendant and docketed in the District Court of the United States for the District of New Jersey as Civil Action No. 1438, including all rights in said action acquired by bill of sale dated September 14, 1945 from the original plaintiff in such action, but nothing herein contained shall impose upon the buyer any obligation to pay any damages which may be hereafter assessed against the Seller pursuant to the counterclaim filed in said action. The Buyer hereby assumes the obligation to pay all cost, counsel fees and expenses connected with the con-

duct of said action which may be incurred or for which bills or vouchers may be rendered after the date of this instrument, provided that the maximum amount of such cost, counsel fees and expenses which the Buyer hereby assumes shall be Five Thousand (5,000) Dollars."

And Moves that said Ostby and Barton Company, a Rhode Island corporation, be joined herein as the party-appellant [fol. 373] in substitution for said Ostby and Barton Company and American Associates, Inc., or in the alternative that said Ostby and Barton Company, a Rhode Island corporation, be joined herein as a party-appellant in addition to said Ostby and Barton Company and American Associates, Inc.

John Vaughan Groner, Counsel for Plaintiffs-Appellants.

Date November 5, 1946.

[fol. 374] Bill of Sale

Know all men by these presents that American Associates, Inc., a Delaware corporation located in Providence, Rhode Island, hereinafter referred to as the Seller, in consideration of Ten Dollars and other good and valuable considerations to it paid by Ostby and Barton Company, a Rhode Island corporation located in said Providence, hereinafter referred to as the Buyer, receipt whereof is hereby acknowledged, hereby covenants and agrees to give, grant, sell, assign, transfer and convey and does hereby give, grant, sell, assign, transfer and convey unto the Buyer all the below described property of the Seller:

1. All inventories owned by the Seller as of the close of business September 30, 1946 in its Ostby and Barton Division consisting of gold and silver, gold and silver seamless wire, jewels and stones, ring trays, brass and plate seamless wire, gold and silver scrap, gold and silver at refiners, components, work in process, finished goods and samples.

2. All property owned by the Seller as of the close of business September 30, 1946 which is customarily carried

on the books of the Ostby and Barton Division as fixed assets.

3. All prepaid insurance and other items and deferred charges of the Seller as of the close of business September 30, 1946.

4. All patents, patent applications, licenses, trade-marks, trade names or brands owned by the Seller in its Ostby and Barton Division, all right, title and interest of the Seller in and to the name "Ostby and Barton", all good will of the Seller connected with its Ostby and Barton Division, and all rights of the Seller as a party plaintiff in that cer-
[fol. 375] tain action entitled Ostby and Barton Company, Plaintiff v. Thoger Gronberg Jungersen, Defendant and docketed in the District Court of the United States for the District of New Jersey as Civil Action No. 1438, including all rights in said action acquired by bill of sale dated September 14, 1945 from the original plaintiff in such action, but nothing herein contained shall impose upon the buyer any obligation to pay any damages which may be hereafter assessed against the Seller pursuant to the counter claim filed in said action. The Buyer hereby assumes the obligation to pay all cost, counsel fees and expenses connected with the conduct of said action which may be incurred or for which bills or vouchers may be rendered after the date of this instrument, provided that the maximum amount of such cost, counsel fees and expenses which the Buyer hereby assumes shall be Five Thousand (5,000) Dollars.

5. All contracts and commitments of the Ostby and Barton Division of the Seller as of the close of business September 30, 1946 for the purchase and sale of property of whatsoever nature.

6. All of the Seller's rights under the contract between Ostby and Barton Company and Albert I. Gordon dated November 12, 1943.

This bill of sale is made pursuant to a contract between the parties dated September 24, 1946 and is subject thereto. By accepting this bill of sale and signing a copy of it, the Buyer assumes the obligation referred to in 4 above and also assumes the obligations and agrees to carry out the contracts, and commitments referred to in said contract.

To have and to hold all and singular the foregoing property to Ostby and Barton Company, its successors and assigns, for its and their own use and behoof forever.

[fol. 376] And the Seller hereby covenants with the Buyer that the Seller is the lawful owner of all such property, and that the same are free from all encumbrances, and that the Seller has good right to sell and transfer the same as aforesaid.

And the Seller for itself, its successors and assigns, hereby further covenants with the Buyer that it will, from time to time, at the request of the Buyer or of its successors or assigns, sign, seal, execute and deliver or cause to be signed, sealed, executed, or delivered all such further bills of sale, instruments of transfer and agreements, supplemental, confirmatory or otherwise as may be reasonably required by the Buyer, its successors or assigns, for the purpose of or in connection with acquiring or more effectually vesting the property, assets, rights and interests of the Seller transferred, assigned, granted or conveyed, or intended to be transferred, assigned, granted or conveyed hereby or hereunder or under said contract dated September 24, 1946.

And for the consideration aforesaid, the Seller hereby irrevocably constitutes and appoints the Buyer, its successors and assigns, true and lawful attorney or attorneys for or in the name of the Seller or otherwise but on behalf and for the benefit of the Buyer, its successors and assigns, to demand and receive at any time the property and inter-

[fol. 377] ests hereby transferred or intended so to be, to give receipts or releases for or in respect to the same or any part thereof, to prosecute in the name of the Seller or otherwise, but at the expense and for the benefit of the Buyer, its successors and assigns, any and all proceedings of any and all kinds which in the discretion of the Buyer, its successors and assigns, may be necessary or desirable in connection with said property and interests, to defend or compromise any and all actions or obligations arising or made in connection with said property and interests and in general to take any and all action which the Buyer, its successors or assigns, may deem necessary or desirable in connection therewith. The foregoing powers are coupled with an interest and shall be irrevocable by the Seller or by its dissolution or in any other manner.

In witness whereof the parties hereto have caused these presents to be signed in their names and behalf by their respective officers thereunto duly authorized, and their respective corporate seals to be hereto affixed this thirtieth day of September, 1946.

American Associates, Inc., by Lawrence E. Green, Vice President; Ostby and Barton Company, by Royal J. Gregg, President.

[fol. 378] STATE OF RHODE ISLAND,
Providence, ss:

October 1, 1946.

Then personally appeared the above named Lawrence E. Green, the Vice President of American Associates, Inc. and acknowledged the foregoing instrument to be his free act and deed as Vice President and the free act and deed of said American Associates, Inc., before me.

Gurney Edwards, Notary Public.

My Commission Expires —— —, ——.

I, Gurney Edwards, a Notary Public in and for the State of Rhode Island hereby certify that the foregoing is a true copy of original bill of sale from American Associates, Inc. to Ostby and Barton Company which was delivered on October 1, 1946.

Gurney Edwards, Notary Public.

My Commission Expires June 30, 1951.

[fol. 379] UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT

Nos. 9222 & 9223

OSTBY AND BARTON COMPANY, and AMERICAN ASSOCIATES, INC., Plaintiffs-Appellants,

vs.

THOGER GRONBERG JUNGERSEN, Defendant-Appellant

ORDER ADDING PARTY PLAINTIFF-APPELLANT

Present: Maris and Kalodner, Circuit Judges, and Follmer, District Judge

Upon consideration of the motion by counsel for Plaintiffs-Appellants, and counsel for defendants stating that he had no objection thereto,

It is Ordered that Ostby and Barton Company, a Rhode Island Corporation, be joined herein as a Party-Appellant.

By the Court, Maris, Circuit Judge.

February 21, 1947.

Endorsements: Order that Ostby & Barton Company, a Rhode Island Corp. be joined as a Party Appellant. Received & Filed Feb. 21, 1947. Wm. P. Rowland, Clerk.

[fol. 380] UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT, OCTOBER TERM, 1946

No. 9222

OSTBY AND BARTON COMPANY and AMERICAN ASSOCIATES, INC., Plaintiffs-Appellants,

vs.

THOGER GROMBERG JUNGERSEN, Defendant-Appellee.

Appeal from the District Court of the United States for the District of New Jersey

And, now, to-wit: this 21st day of February A. D. 1947, it is ordered that Hon. Frederick V. Follmer, District Judge for the Middle District of Pennsylvania, be, and he

is hereby assigned to sit in above case in order to make a full court.

Albert B. Maris, Circuit Judge.

Endorsements: Order Assigning Hon. Frederick V. Follmer for Argument. Received & Filed Feb. 21, 1947. William P. Rowland, Clerk.

[fol. 381] UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT, OCTOBER TERM, 1946

No. 9223

OSTBY AND BARTON COMPANY and AMERICAN ASSOCIATES, INC., Plaintiffs-Appellees,

vs.

THOGER GROMBERG JUNGERSEN, Defendant-Appellant.

Appeal from the District Court of the United States for the District of New Jersey

And now, to-wit: this 21st day of February A. D. 1947, it is ordered that Hon. Frederick V. Follmer, District Judge for the Middle District of Pennsylvania, be, and he is hereby assigned to sit in above case in order to make a full court.

Albert B. Maris, Circuit Judge.

Endorsements: Order Assigning Hon. Frederick V. Follmer for Argument. Received & Filed Feb. 21, 1947. William P. Rowland, Clerk.

[fol. 382] UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT, OCTOBER TERM, 1946

Nos. 9222 and 9223

OSTBY AND BARTON COMPANY and AMERICAN ASSOCIATES, INC., Plaintiffs-Appellants,

v.

THOGER GRONBERG JUNGERSEN, Defendant-Appellant

Appeals from the District Court of the United States for the District of New Jersey

Argued February 21, 1947

Before Maris and Kalodner, Circuit Judges, and Follmer, District Judge

OPINION OF THE COURT—Filed September 5, 1947

Per CURIAM:

For the reasons stated in the opinion of Judge Meaney, 65 F. Supp. 652, the judgment of the District Court will be affirmed.

A true Copy. Teste:

——— ———, Clerk of the United States Circuit Court of Appeals for the Third Circuit.

[fol. 383] IN THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT: OCTOBER TERM, 1946

No. 9222

OSTBY AND BARTON COMPANY, and AMERICAN ASSOCIATES, INC., Plaintiffs-Appellants,

vs.

THOGER GRONBERG JUNGERSEN, Defendant-Appellee

Before Maris and Kalodner, Circuit Judges and Follmer, District Judge

On Appeal from the District Court of the United States for the District of New Jersey

This cause came on to be heard on the transcript of record from the District Court of the United States, for the District of New Jersey, and was argued by counsel.

On consideration whereof it is now here ordered and adjudged by this Court that the judgment of the said District Court in this case be, and the same is hereby affirmed with costs.

By the Court: Kalodner, Circuit Judge.

September 5, 1947.

Endorsements: Order affirming judgment, etc. Received & Filed Sept. 5, 1947. Ida O. Creskoff, Clerk.

[fol. 384] IN THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT, OCTOBER TERM, 1946

No. 9223

OSTBY AND BARTON COMPANY, and AMERICAN ASSOCIATES, INC., Plaintiffs-Appellees,

vs.

THOGER GRONBERG JUNGERSEN, Defendant-Appellant

Before Maris and Kalodner, Circuit Judges and Follmer, District Judge

On Appeal from the District Court of the United States for the District of New Jersey

This cause came on to be heard on the transcript of record from the District Court of the United States, for the District of New Jersey, and was argued by counsel.

On consideration whereof, it is now here ordered and adjudged by this Court that the judgment of the said District Court in this case be, and the same is hereby affirmed with costs.

By the Court: Kalodner, Circuit Judge.

September 5, 1947.

Endorsements: Order Affirming Judgment, etc. Received & Filed Sept. 5, 1947. Ida O. Creskoff, Clerk.

[fol. 385] UNITED STATES OF AMERICA,
Eastern District of Pennsylvania,
Third Judicial Circuit, Set:

I, Ida O. Creskoff, Clerk of the United States Circuit Court of Appeals for the Third Circuit, do hereby certify the foregoing to be a true and faithful copy of the original Volume I of the Joint Appendix, and the proceedings in this court, in the cases of Ostby and Barton Company and American Associates, Inc., Appellants, vs. Thoger Gronberg Jungersen, No. 9222, and Ostby and Barton Company and American Associates, Inc. vs. Thoger Gronberg Jungersen,

Appellant, No. 9223, on file, and now remaining among the records of the said Court, in my office.

In Testimony Whereof, I have hereunto subscribed my name and affixed the seal of the said Court, at Philadelphia, this 19th day of November in the year of our Lord one thousand nine hundred and forty-seven, and of the Independence of the United States the one hundred and seventy-second.

Ida O. Creskoff, Clerk of the U. S. Circuit Court of Appeals, Third Circuit. (Seal.)

[fol. 386] SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1948

No. 7

On Petition for Writ of Certiorari to the United States Circuit Court of Appeals for the Third Circuit

ORDER ALLOWING CERTIORARI—June 7, 1948

A motion for leave to file a petition for rehearing and petition for rehearing having been submitted in this case;

Upon consideration thereof, it is ordered by this Court that the motion for leave to file and petition for rehearing be, and the same are hereby, granted.

It is further ordered that the order of January 12, 1948, denying certiorari be, and it is hereby, vacated; and that the petition for writ of certiorari herein be, and it is hereby, granted. The case is consolidated with Nos. 468 and 776 for argument.

It is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

[fol. 387] SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1948

No. 8

On Petition for Writ of Certiorari to the United States Circuit Court of Appeals for the Third Circuit

ORDER ALLOWING CERTIORARI—June 7, 1948

A motion for leave to file a petition for rehearing and petition for rehearing having been submitted in this case;

Upon consideration thereof, it is ordered by this Court that the motion for leave to file and petition for rehearing be, and the same are hereby, granted.

It is further ordered that the order of January 12, 1948, denying certiorari be, and it is hereby, vacated; and that the petition for writ of certiorari herein be, and it is hereby, granted. The case is consolidated with Nos. 467 and 776 for argument.

It is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

[fol. 388] IN THE SUPREME COURT OF THE UNITED STATES

STIPULATION RE OMISSION OF CERTAIN EXHIBITS FROM PRINTED RECORD—Filed July 12, 1948

The Slatis-Dee and Austenal prior use defenses having been withdrawn by counsel for Ostby and Barton Company et al. and Baden et al., it is hereby stipulated that the below-listed exhibits relating to the withdrawn defenses shall be omitted from the record in the above cases.

The exhibits to be omitted are the following, the exhibits being identified by their exhibit numbers in the Circuit Court of Appeals record in the Ostby and Barton Company et al. case:

Plaintiffs' Exhibit P-2, consisting of photographs reproduced at pages 370a-382a inclusive in Volume II of the Ostby and Barton Company et al. record;

[fol. 389] Plaintiffs' Exhibits P-9 through P-12, appearing on pages 383a-399a inclusive in Volume II of the Ostby and Barton Company et al. record;

Defendant's Exhibits D-4, D-5, D-6 and D-29 through D-32, appearing on pages 504a-506a and 515a-518a inclusive in Volume II of the Ostby and Barton Company et al. record.

Dated: July 2, 1948.

William H. Davis, Counsel for Jungersen, per G. H.

Dated: July 6, 1948.

John Vaughan Groner, Counsel for Ostby and Barton, Co. et al.

Vol. II

TRANSCRIPT OF RECORD

(Paegs 400a to 514a)

Supreme Court of the United States

OCTOBER TERM, 1948

No. 7

THOGER GRONBERG JUNGERSEN, PETITIONER,

vs.

OSTBY AND BARTON COMPANY AND AMERICAN ASSOCIATES, INC.

No. 8

OSTBY AND BARTON COMPANY AND AMERICAN ASSOCIATES, INC., PETITIONERS,

vs.

THOGER GRONBERG JUNGERSEN

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE THIRD CIRCUIT

PETITIONS FOR CERTIORARI FILED DECEMBER 4, 1947.

CERTIORARI GRANTED JUNE 7, 1948.

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Plaintiff's Exhibit P-19.

No. 748,996. PATENTED JAN. 5, 1904.

J. F. SPENCER.

MOLD.

APPLICATION FILED SEPT. 5, 1903.

NO MODEL. 5 SHEETS—SHEET 1.

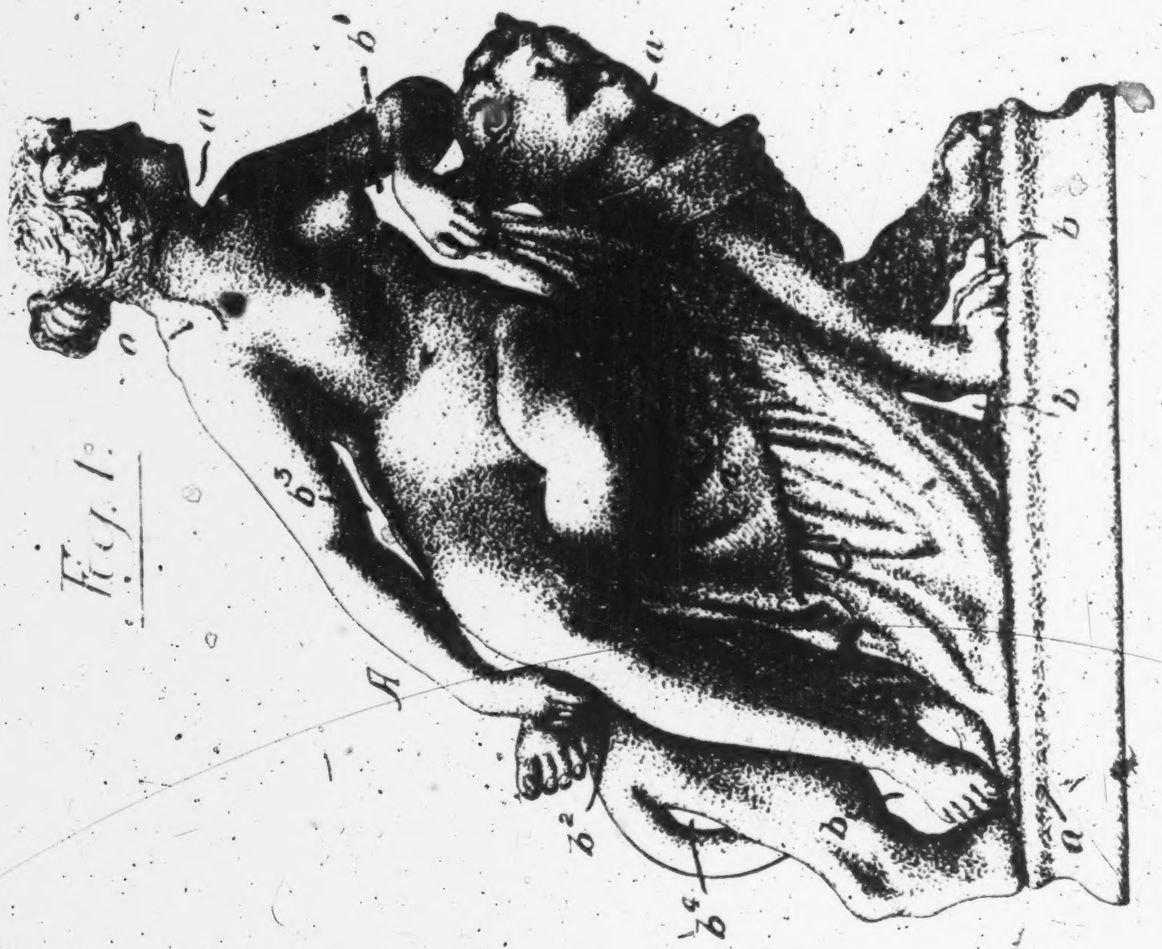


Fig. 1.

Witnesses:
Frank L. A. Graham
Herman E. Metius

Inventor:
Jesse F. Spencer,
by Howson & Howson
Attorneys

Plaintiff's Exhibit P-19

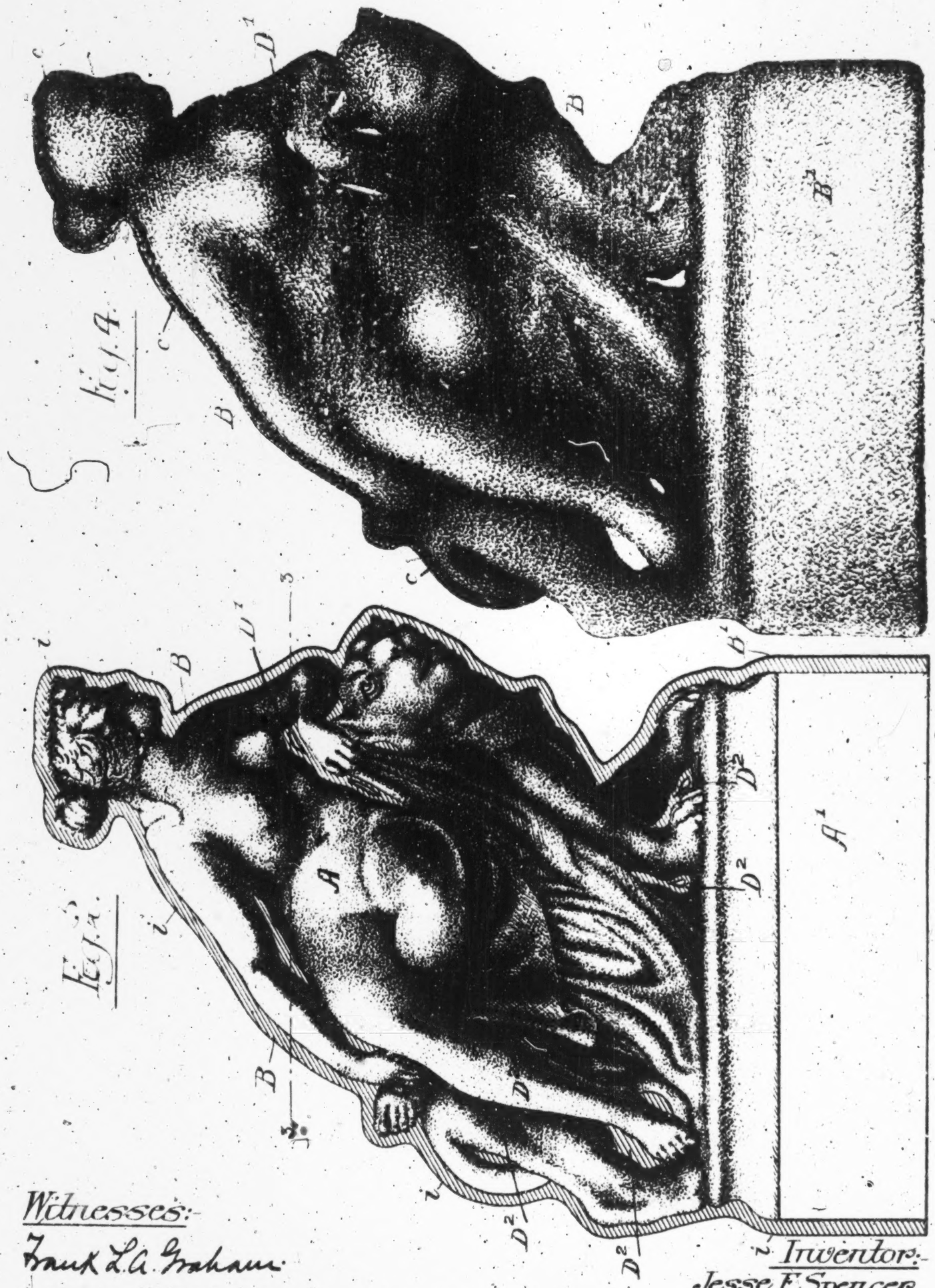
No. 748,906. PATENTED JAN. 5, 1904.

J. F. SPENCER.

MOLD.

APPLICATION FILED SEPT. 5, 1902.

NO MODEL. 5 SHEETS-SHEET 2.



Witnesses:
Frank L. A. Graham.
Herman E. Metius.

Inventor:
Jesse F. Spencer.
by his Attorneys: Howson & Howson

Plaintiff's Exhibit P-19

No. 748,996. PATENTED JAN. 5, 1904.

J. F. SPENCER.

MOLD.

APPLICATION FILED SEPT. 5, 1902.

NO MODEL. 5 SHEETS-SHEET 3.

Fig. 8.

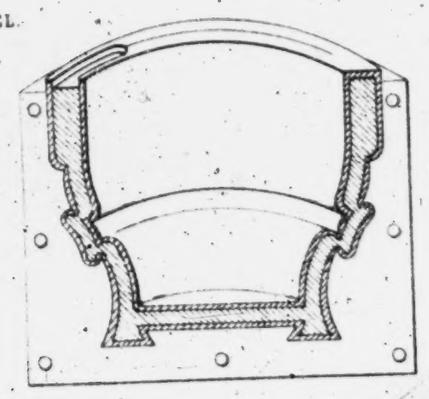
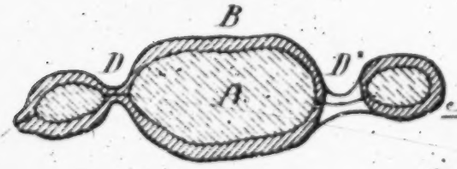


Fig. 6.

Fig. 3.



Witnesses:
Frank L. Graham.
Herman E. Mettins

Inventor:
Jesse F. Spencer,
by his Attorneys,
Howson & Howson

Plaintiff's Exhibit P-19

No. 748,996. PATENTED JAN. 5, 1904.

J. F. SPENCER.

MOLD.

APPLICATION FILED SEPT. 5, 1902.

NO MODEL. 5 SHEETS—SHEET 4.

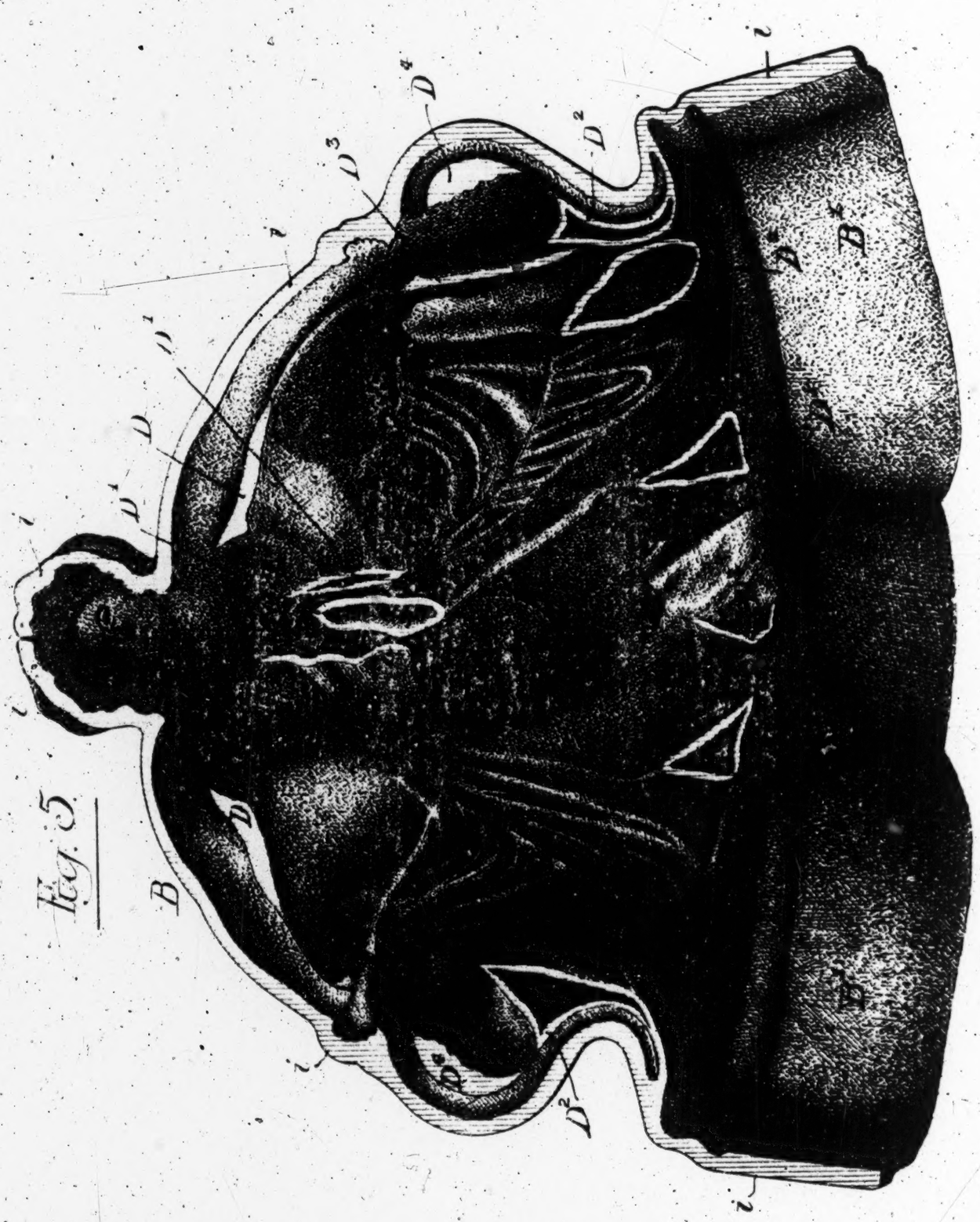


Fig. 5.

Witnesses:
Frank L. A. Graham.
Herman E. Metcis

Inventor:
Jesse F. Spencer,
by his Attorneys:
Howson & Howson

Plaintiff's Exhibit P-19

No. 748,996. PATENTED JAN. 5, 1904.

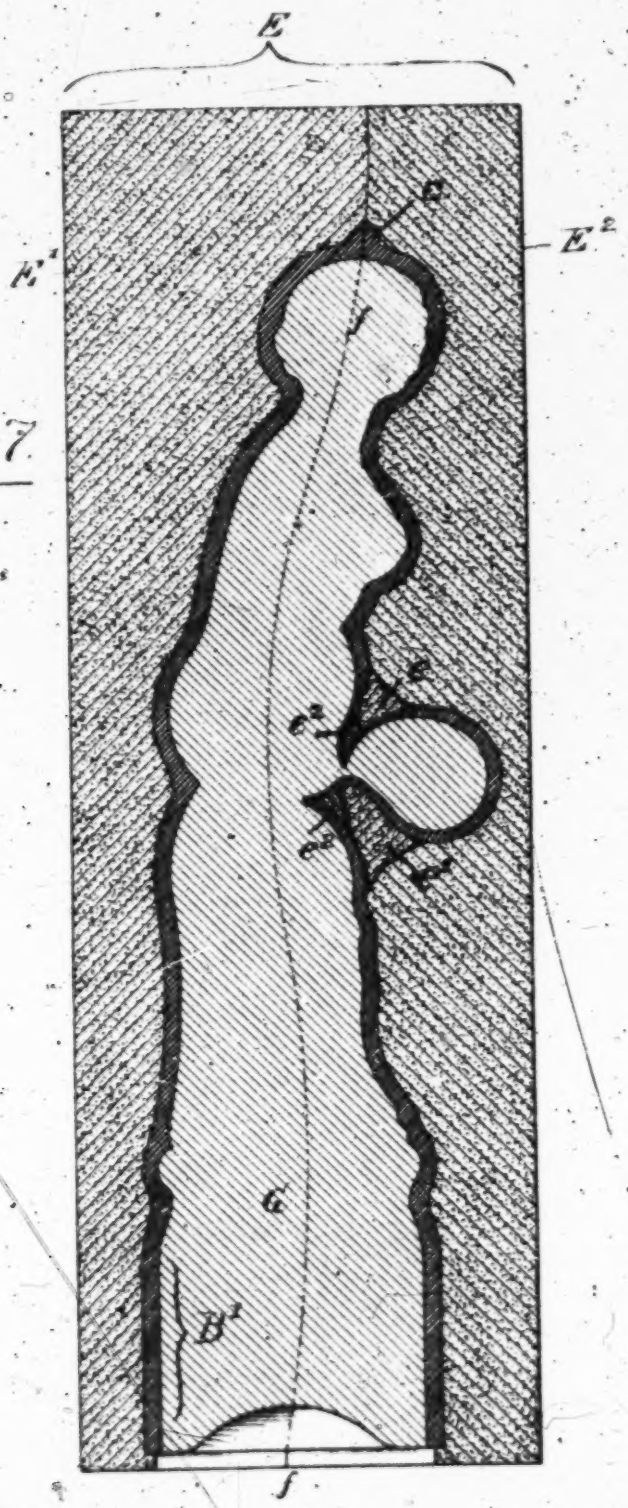
J. F. SPENCER.

MOLD.

APPLICATION FILED SEPT. 5, 1902.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 7.



Witnesses:-
Frank L. A. Graham
Herman E. Metcis.

Inventor:
Jesse F. Spencer,
by his Attorneys,
Howson & Howson

Plaintiff's Exhibit P-19

No. 748,996. Patented January 5, 1904.

UNITED STATES PATENT OFFICE.

JESSE F. SPENCER, OF PHILADELPHIA, PENNSYLVANIA.

MOLD.

SPECIFICATION forming part of Letters Patent No. 748,996, dated January 5, 1904.

Application filed September 5, 1902. Serial No. 122,204. (No model.)

To all whom it may concern:

Be it known that I, JESSE F. SPENCER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Molds, of which the following is a specification.

The object of my invention is to make an elastic and substantial mold directly from any plain or intricately-formed pattern it is desired to reproduce without necessarily destroying the said pattern, the mold providing a means by which any desired number of reproductions of the form of the pattern or any fractional part thereof can be made in any suitable material.

The mold is composed of caoutchouc or equivalent compound, and the particular ingredients for proper vulcanization as well as the preparation of the compound and the mixture with the same of any proper adulterants or materials, such as a flexible fabric, will depend on the vulcanization employed and the degree of elasticity desired.

I have found that the most difficult patterns having a wide diversity of intricate forms and of undercut and projecting parts and the most delicate detail can be reproduced directly from the pattern in facsimile form by my elastic mold, the latter being a perfect negative of the pattern to be reproduced and in return producing a perfect positive duplicate, which may be made either solid or hollow and will have all the intricate features of the original.

In the accompanying drawings, Figure 1 is a view of the pattern in the round to be reproduced. Fig. 2 is a sectional view of the pattern within a flexible mold, the section being on one side of the center. Fig. 3 is a sectional view on the line 3 3, Fig. 2. Fig. 4 is an exterior view of the mold. Fig. 5 is a view showing the mold split and partly opened. Fig. 6 is a sectional view of the mold, taken through the center, showing it partly cut. Fig. 7 is a sectional view of a sectional supporting-casing in which the mold is preferably inserted while forming a reproduction therein, and Fig. 8 is a sectional view of a modification of my invention.

I will first give a brief description of my invention.

It consists of an elastic mold made preferably, of rubber or a compound in which caoutchouc forms an important part. The pattern A, Fig. 1, and the form for the pouring-head are coated with a comparatively thin coating of rubber in an unvulcanized state, the thickness of the coating varying with the form and size of the pattern. After the pattern A has been coated the mold B thus formed is vulcanized in any suitable manner without removing the pattern. I preferably use the vulcanizing process claimed in the application for patent filed by me on the 20th day of July, 1901, Serial No. 69,051. After the mold is vulcanized a casing E is constructed around it before the mold is removed from the pattern. This casing is preferably made in two or more parts and acts as a support for the rubber mold B in making casts from the mold. After the casing is constructed it is removed from the mold, and the mold is then cut on certain lines, depending upon the form of the pattern, as shown in Figs. 3 and 6, so that it can be flexed sufficiently to allow the pattern A to be withdrawn. The mold and its casing is then complete and ready to be used to make duplicates in wax or other suitable material of the original pattern.

The method of making the mold is claimed in an application for patent filed by me on December 9, 1903, Serial No. 184,477.

In order to illustrate my invention, I have chosen an object of art rather than one of utility to show an intricate pattern, as objects of art, such as shown in the drawings, are generally of more intricate form than objects of utility, and the advantages of the use of my improved mold are thereby more easily understood than if shown in a simpler form.

By the use of my invention I can reproduce the form of any pattern from the simplest to the most complex without making the mold in a number of independent sections, thereby making what I call a "single" mold, which can be made in one piece and treated as a unit during its formation and future manipulation.

My improved mold provides a means of producing at a very low cost a great variety of objects of art and utility in a great variety of materials which can only be made at present at great expense, and it also opens possibilities of producing entirely new things which have not been attempted heretofore on ac-

Plaintiff's Exhibit P-19

count of the limitations of the present state of the art.

The pattern to be reproduced may be in a whole or undivided state or made up of a number of independent pieces brought intimately together, said pieces varying in the materials of which they are formed or otherwise.

The pattern may be modeled in the round or flat and of plain or intricate form and either solid or hollow or with both solid and hollow portions combined, and it may have any number of sides or surfaces or undercut or projecting parts, the said surfaces being finely engraved in intaglio or relief or otherwise, as desired, or it may consist of groups of objects made up of different substances and may be composed of strong or fragile, rigid or elastic material or a combination of them all and may be either of a dense nature or porous, providing it will withstand the heat necessary to the production of the mold, if heat is used in the formation of the latter.

Vulcanization by heat in connection with a proper caoutchouc compound is considered the most desirable mode of producing my improved mold, the formation and ingredients for the vulcanization and adulteration of the said compound depending on the vulcanization employed and the elasticity desired; but in case it is desired to reproduce the form of patterns which would not withstand the heat of vulcanization then I resort to any of the well-known means of vulcanization by what is known as the "cold" or "chemical" process.

My improved mold being made directly on the original pattern results in the reproduction of the exact form, size, and proportions and perfect relative position of the different parts of the pattern by a minimum number of intervening steps and with a minimum amount of time and labor. The said mold being very strong and durable, can be roughly handled without the liability of its being injured and can be used repeatedly without deterioration in its smallest detail and will produce many more reproductions of a pattern in a great variety of materials than by any other known means. Its great elasticity and strength, its non-absorbent nature and heat-resisting qualities, its resistance to the action of chemicals, its power of reproducing the most intricate forms and the finest detail with a minimum number of sectional lines showing on the reproduction and with no restrictions as regards to practical size of the pattern to be reproduced, its capacity for retaining its proper shape through hard usage, and its comparatively small cost make it an ideal medium for the reproduction of plain or intricate forms.

I will now describe the process I prefer to use in manufacturing the said mold if it is composed of caoutchouc and its compounds and the pattern to be reproduced is an intricately-formed object, such as the statuette shown, said statuette being modeled in the round and either solid or hollow.

If the pattern is hollow or has any hollow parts which are completely surrounded and with no vents to allow for the escape of the confined air, then a small vent is preferably made in some inconspicuous part to allow for the expansion and escape of the confined air, as the latter may expand to such an extent under the heat of the vulcanization treatment as to fracture the pattern. This vent is not always necessary, for the pressure of the uncured composition composing the mold, combined with the pressure necessary for vulcanization in the case of vulcanization by heat, is generally enough to counteract the expanding-air pressure, especially if the hollow pattern is made of a strong material; but it is always safer to provide the air-vent, if possible. In case of vulcanization by the cold or chemical process this contingency need not be taken into consideration.

If the pattern is composed of a substance that will be acted upon by the compositions composing the mold either in a solid or fused state, but especially when exposed to heat, then said pattern should receive a thin coating of some material—such as a hard varnish or a thin metal, such as aluminium leaf—that will not perceptibly alter the contour or detail of the pattern and will prevent the chemical action thereupon of the compound forming the mold either in its solid or fused state; otherwise the materials composing the mold will be inclined to form a chemical combination with the pattern which will cause them to stick together to an extent in some cases that will necessitate the destruction of the mold in the separation of the same from the pattern after vulcanization. This applies especially to patterns that are made of metals which are actively acted upon by sulfurous substances in a fused state. If the pattern is of a porous nature and is inclined to absorb moisture, it should be thoroughly dried before giving it its coating of the compound forming the mold, if the latter is to be exposed to heat, for in the case of heat vulcanization the moisture will be inclined to come to the surface of the pattern, and if it comes in contact with many of the compositions that may be used in the making of the mold will be detrimental to the latter and also detrimental to the object which it is desired to reproduce.

Referring to Fig. 1 of the drawings, A is the pattern, which in the present instance is a statuette molded in the round and of multifarious form and more or less hollow. The parts indicated by the reference-letter *a* are more or less undercut, while the parts indicated by the reference-letters *b*, b', b^2, b^3, and b^4 are not only undercut, but are open and surrounded by other parts and have many difficult and intricate features to overcome in the formation of the mold and the with-

drawal of the reproduction from it than is found in the undercut alone and requiring entirely new and original methods to produce a mold in which such reproductions of the pattern can be formed and withdrawn therefrom, for as the pattern is composed of many projecting parts varying in size and form and in some cases being joined at their several extremities to the main body of the pattern, as the arm, hand, and drapery of the figure at b', Fig. 1, while other of the said parts are joined only at one extremity, as the leg at b^2, Fig. 1. This results in both of the above-mentioned parts being more or less separated from the adjacent parts of the pattern by open spaces of intricate form and varying dimensions, and the said open spaces being more or less surrounded by the parts above mentioned and which open spaces can be of a size much larger than the spaces between the communicating parts of the pattern and through which latter open spaces the parts of the mold formed within the large open spaces must be withdrawn after the necessary cutting in order to remove the pattern and reproductions from the mold.

Figs. 2 and 3 illustrate a pattern having a coating of the rubber compound which forms the mold. The walls of the mold are of varying thickness, and the exterior surface of the mold follows the general contour of the pattern.

The mold B may cover the entire surface of the pattern or any fractional part thereof which it is desired to reproduce and is formed of a comparatively thin layer of the compound of a thickness varying with the character of the pattern's formation and size, generally the undercut and receding parts and parts difficult of access being made the thinnest, so that after the necessary cutting, if the latter is required, their comparatively small bulk will allow of their being easily withdrawn from those parts, while those parts easily removed from the pattern may be made comparatively thick, thereby giving greater rigidity to the mold as a whole; but no parts of the mold should be made any thicker than is required for the necessary stability of the mold, and a rib *c*, Figs. 4 and 7, is preferably formed on the outer surface of the mold where it is to be parted by cutting. The pattern A being ready to be coated by the composition composing the mold will if said mold is to be composed of caoutchouc or its compounds preferably be given a coating of this composition, made liquid by its proper solvent or solvents, this coating, which can be applied either by brushing it on the pattern or by dipping the pattern into it, being so thick that when it is dry or its solvents are evaporated as to give the entire pattern, and especially its receding parts, a tenacious film to which the future layers of the plastic caoutchouc compound will adhere. When the solvents of the liquid coating have evaporated sufficiently to permit of the handling of the pattern, it will be found that this coating while of a sticky nature will not leave the surface of the pattern when the latter is handled carefully. The main coating which is to form the mold is now applied. This may be what is known to workers in caoutchouc compounds as "unvulcanized mixed sheet," or it may be a plastic unformed mass or a thick liquid, or all three of the above combined, which when vulcanized will form an elastic body, any of these forms of the compound being suitable for use if the vulcanization is to be by heat, the mixed sheet, however, being preferred or predominating in its combination with the unformed mass of thick liquid. A sheet of the required thickness is cut into strips or pieces of the desired size and form and applied to the pattern, the sheet being either in its normal or unstretched condition or stretched, as the occasion requires. It will generally be found that in covering the varying surfaces of a complex form the concave surfaces will require the caoutchouc compound to be applied in an unstretched state, the first-applied liquid film holding it in place, while surfaces that are convex in form will permit of the compound being applied either stretched or unstretched, and oftentimes the combination of stretched and unstretched compounds applied to convex surfaces in different layers is found to be very desirable. If in the case of a concaved surface the compound is stretched when applied, it will have a tendency to draw away from the surface on account of its elasticity, the liquid film first applied not being strong enough to hold it in place, and this will result in a space being left between the sheet and the surface of the pattern. If close contact with the surface is not secured and an air-space of any great extent is formed, no good results can be expected.

In placing the pieces or strips on the pattern care must be taken to see that all joints are perfectly made and that there are no open spaces left between joints or layers. The joints are not difficult to make, for the natural tendency of the raw composition is to cement itself together, and one layer of the sheet can be placed upon another until any required thickness is secured, its power of cementation making the different layers a homogeneous mass if they are brought [illegible] mately together, or, if necessary, one or more subsequent liquid coatings can be applied to the different layers oftentimes with good effect, as the manipulation of the different layers by the hands will sometimes lessen their adhesiveness.

In the case of a complex pattern such as we are considering the number of layers or thickness of layers applied will be in accordance with the character of the formation of said pattern, some parts of it having, preferably, a thin coating, while others parts have to be made thicker.

While it is desirable to make the mold no

thicker than is necessary to give it its proper stability and its required elasticity, still the proportions of thick and thin coatings must vary considerably on account not only of the formation of the pattern, but also of its size.

Generally in the undercut or receding parts it is desirable to make the mold so thin that, considering its elasticity, it will withdraw in these receding parts without fracturing the most delicate substance that may be cast in it and at the same time have rigidity enough to withstand the pressure of the material used in forming the reproduction of the pattern without getting out of shape, while in those exterior parts of the pattern from which the mold can be easily removed the mold may be made comparatively thicker, thereby making it as a whole more rigid and capable of retaining its proper form, as shown in Figs. 3 and 6.

The portions of the mold B within the open spaces of the pattern A, as seen at D' D^2, Fig. 2, cannot be made solid, as it would be impossible to withdraw the mold at these parts without fracturing the mold or its contents. Therefore those parts of the pattern which form an open space such as seen at b', Fig. 1, should be covered with as thin a layer of the rubber compound as the necessities of the case will allow; and after vulcanization when these abutting surfaces are cut and separated to allow of the withdrawal of the pattern from the mold these parts, as seen at D', Figs. 4 and 5, being hollow and comparatively thin and elastic can be so manipulated as to withdraw easily through the sinuous passages through which they enter to the large open space; but in that part of the pattern which forms an open space such as seen at b^3 and b^4, Fig. 1, the adjacent walls of the mold may be connected by making the mold solid, and these spaces, as seen at D and D^4, Figs. 5 and 6, providing these parts of the pattern are so formed that they will allow of these solid parts of the mold to be cut and withdrawn when separated without danger to that portion of the pattern or reproduction. Such solid connecting parts are desirable, as they make the mold more rigid and hold the parts in their natural relative positions, and when cut or split vertically into longitudinal sections they avoid the danger of leakage, which would exist when such parts are not made solid and are cut. It also allows of a simpler form of sectional casing. In the formation of this solid connecting part it should be made no thicker than the necessities of proper rigidity require and yet thick enough to allow for the necessary splitting of the parts, as above mentioned.

It is better generally to give the whole surface of the pattern A a single coating of the sheet before attempting to increase the thickness of those parts that it is necessary to make thicker. The operator after a little experience will soon recognize the necessary treatment of the pattern and will find when he understands the great possibilities of the manipulation of the caoutchouc compounds that the most intricately-formed pattern is easily covered.

While I preferably make the mold B entirely of an elastic caoutchouc compound—that is, pure caoutchouc with its necessary ingredients to form a perfectly vulcanized elastic compound, said compound being considered the best for a mold of small or moderate size and which while being more costly has more elasticity and resistance to the action of those chemical substances that may be cast in it—yet in some instances, and especially where the mold is of a large size or extreme elasticity is not necessary or it is desired to economize in the use of the above caoutchouc compound, the said compound may have mixed with it any required adulterant or the mold may be made of a facing of either of the above, and the caoutchouc compound may be backed in any or all of its parts with any suitable strengthening or supporting medium, such as a flexible fabric, or it may be faced with any caoutchouc compound, as above, and a suitable strengthening or supporting material added and then another backing of any of the above caoutchouc compounds applied to this, especially if the vulcanizing medium to be employed is of a nature that will be absorbed by the flexible fabric, and thereby detrimental to the mold. In this combination of layers of different materials the liquid caoutchouc compounds previously mentioned should be freely used between the layers in order to make as homogeneous a body as possible.

As it is a very important matter that the molds shall be properly filled, it is found advisable in many cases to add to the mold proper an extension B', which forms a pouring-head.

The size, form, and location of the pouring-head B' may vary with each mold, and it should be made to connect with the least conspicuous part of the pattern, which is generally the base of the pattern, if it has one. In some cases it may be found desirable to have two or more pouring-heads in connection with the mold, and these may be connected by a proper channel, if desired.

To form the pouring-head B', any suitable pattern A' of the required size and form is secured to that part of the main pattern A upon which the pouring-head is to be located, this being best done when that part of the pattern which the pouring-head is to join has had at least one coating of the material forming the mold. The form is then held to the pattern, and the material forming the mold is then continued on over the form until it has received its proper coating, and it is now treated as part of the pattern.

It may be found desirable to divide the patterns into sections in order to cover all the parts with the caoutchouc compound. When these separated parts are uniformly covered,

they are brought together again in their proper positions and fastened by the addition of some of the compound, and when the pattern and all its parts are joined again in their natural relative positions it is vulcanized.

When it is desired to make a mold having both the contour of the interior as well as the exterior of the pattern and the interior is so formed that the caoutchouc compound can be conveniently applied, the interior may be treated in the same way as above and a negative of the interior thus secured, either attached or unattached to the exterior of the negative, as desired, as illustrated in Fig. 8. The mold covering the pattern being ready to be vulcanized is placed in the vulcanizing apparatus, preferably such as that described in the application for patent filed by me on December 12, 1903, Serial No. 184,945, and vulcanized by the process set forth in the application alluded to in the first part of this specification or by any other suitable vulcanizing process.

As certain stages of vulcanization by heat result in the mold becoming very soft and plastic, care should be taken in placing the mold in the vulcanizing-chamber to see that the softened mold will not be forced out of its proper position by the weight of the inclosed pattern pressing it upon the bottom or sides of the vulcanizing-chamber or anything else which would force it out of shape.

Generally the mold can rest upon that part of the pouring-head which is left uncovered; but where a mold has no such place that is practical to support it then it may be fastened at the bottom or suspended by a wire from the top of the vulcanizing-chamber, (this will depend upon the vulcanizing medium employed,) said wire being fastened to some suitable part of the pattern and passing through the mold.

After vulcanization is secured and when the mold is cold and set and in its normal vulcanized condition it should not be cut or removed from the pattern until the supporting-casing E has been formed.

It is a matter of great importance that the elastic mold in all its parts, and especially in those parts that have been cut and separated, should be brought together easily and held securely in their normal relative positions when the mold is being manipulated for purposes of reproduction, and there are often many cut and divided parts in the interior of the mold, such as D D' D^2 D^3, to which access is difficult and which cannot be brought exactly together and held securely in the absence of an outer supporting-casing. Such casing, however, forms the subject of my divisional application, filed December 11, 1903, Serial No. 184,789, and a detailed description of such casing and the method of making the same will be unnecessary.

The supporting-casing E may be made of plaster-of-paris or other suitable material, which is cast around the mold while it is still on the pattern. This supporting-casing E is made in two or more parts E' E^2, depending upon the shape of the mold. The undercut portions *e e' e²* are filled, as fully described in the companion application referred to above.

After the supporting-casing E is set it is removed, and the mold is cut at the points desired, so that the pattern can be withdrawn from the mold. After the pattern is removed the mold can be closed and the supporting-casing secured in position, so as to properly support it when duplicates of the pattern can be reproduced in the mold.

In some instances where certain of the parts of the mold are made rigid enough not to require additional support a skeleton casing may be sufficient to support those parts that require strengthening, and where a mold can be made so rigid as to retain its proper form when being filled by the composition forming the reproduction the casing E or other extra means of support and retention can be dispensed with, and the mold can be kept closed in its normal position by pins, clasps, or wrappings.

The mold is not cut necessarily into independent pieces, but is so cut that the pattern can be readily removed. The mold, as illustrated in the drawings, Fig. 5, is cut at *i i*, and cuts or openings are especially necessary in the form shown, these cuts being made at D D' D^2 D^3 D^4 in Fig. 5 and D D' in Fig 3, the necessity for such openings arising not only from the limitations of the elasticity of the mold, but on account of the intricate form of the pattern, its form making it a physical impossibility to remove the mold without cutting it in certain of its parts—for instance the part that fills the opening *b³*, Fig. 1, between the arm and the body, where the mold is made solid, and *b'*, Fig. 1, where it is made hollow. When the mold is being formed in its unvulcanized state, account should be taken of where these cuts or openings must eventually be made.

When, as in some cases, it is desired to bring two or more parts of the composition forming the mold together, as seen at D and D^4, Fig. 5, with the intention of eventually separating them after vulcanization, they may be separated after vulcanization by little or no cutting if when placing the parts together before vulcanization a thin coating of soapstone or a thin metal leaf is placed between them. This plan is often convenient, as in forming the mold it is more plainly seen where the future divisions should be made than after the mold is completed.

It is often desirable to form a rib *c*, of rubber, on that part of the mold that it will afterward be necessary to cut, especially in those parts of the mold which have thin walls, as the cut parts should be as thick as they can be conveniently made in order to prevent leakage. Also parts of the mold may be made solid in the first place, and after vulcaniza-

tion these parts may be cut out or burned out to the required thickness, and the mold can be cut and trimmed in any other desired manner after vulcanization, or the interior or matrix may be cut and altered and parts removed, as desired.

There are some few cases where it may be necessary on account of the large size of the mold or its exceptionally intricate form to cut and divide the mold after it is finished into two or more independent sections for convenience of handling. The mold can also be constructed in as many separated parts or independent elastic sections as desired, thereby forming a sectional elastic mold. The construction of the same, however, is more difficult and costly than the construction of a single or unitary mold, as is also the future or ultimate use of it. Consequently in most instances I prefer to use a single mold cut or slit only sufficiently to allow it to to be opened for the removal of the original and its reproduction, but not separated into independent individual sections.

By the use of the words "cut" or "slit" I mean to imply first a cut or slit which causes an opening in the mold, as at *i*, Figs. 2, 5, and 6, one or more of the extremities of the said cut or slit remaining united, and, second, a cut or slit which causes an opening in the mold, as at D D' D^2 D^3, Fig. 5, said opening causing a complete division of the parts cut in all their extremities, but not separating the mold into independent individual pieces, the parts divided remaining in close association through their adherent parts, which unite them and which bring these cut parts to their natural relative position again when the mold is closed and in its normal state.

After the mold is removed from the pattern it should have any number of small vent-holes pierced through it that may be found necessary to allow for the escape of air in any space where it would be inclined to collect when the mold is being filled with the composition used in making the reproduction. In some cases where the composition of the material used in making the reproduction is of a weak nature and there are delicate parts which might be easily broken in the removal of the mold therefrom the chance of fracturing is much lessened by giving the interior surface or matrix of the mold a very thin coating of vaseline or equivalent substance. This can be applied with a stiff brush of a size that will carry the vaseline into all the details of the matrix. This coating also has other advantages. Thus in pouring a fused substance into the mold it will prevent the formation of the very small air-bubbles which sometimes form on the surface of the reproduction if the coating is not used. The formation of such bubbles may be prevented also by thoroughly drying the interior of the mold before the formation of the reproduction therein.

The mold being closed and held closed by suitable means, such as the sectional casing described, the reproduction is made by pouring into the mold the material G, Fig. 7, desired either in a liquid, semiliquid, or fused state, or the material may, if in a plastic condition, be worked in by hand if the form of the mold will permit it, or if the mold will not permit of the hand being used in filling it then it may be filled by any other suitable means. The mold being filled in all of its parts, the material G, forming the reproduction, if necessary, is permitted to set or harden, and the mold B is then released from its supporting medium, opened and stripped from the reproduction, which will be a perfect facsimile in form of the original pattern.

The process of forming the reproduction in the mold forms the subject of my divisional application filed December 11th, 1903, Serial No. 184,788.

There are some reproductions which may have certain of their parts made from material different from that which forms the main part of the reproduction. In this case a sectional elastic mold can be more conveniently used in order to insert the material.

In the formation of a solid product many of the materials used are apt to be those that would shrink in cooling, setting, or drying. Hence the pouring-head B' is filled and the mold is kept full during the setting and shrinking of the material by the surplus material contained in the pouring-head. This applies mostly to materials used in a liquid or semiliquid state; but where a mold is to be filled by a thick plastic mass the pouring-head is not always necessary, especially if it is not to hold a core in its reproduction; but it is generally desirable to have a pouring-head, as the mold can then be used for either purpose.

The pouring-head should be located or attached at that part of the mold where a core may be most easily inserted, if a core is used, or if more than one pouring-head is used one or more may be used for filling and the others used for the introduction of the core, the size, form, and location of the core-irons varying with the pattern.

If the core-irons are to pass completely through the mold and to extend for a distance beyond the exterior walls, the fitting of the core-irons to the mold and the proper joints are made after the mold is removed from the original pattern and the shape and size of the required core-irons are known.

When a mold has been made without a pouring-head and in its manipulation the necessity for one arises, a substitute for one on the mold can be constructed of any suitable material on that part of the sectional casing out of which the mold opens.

In some cases the mold may be formed over a flat pattern, and after removal from the pattern it may be bent so as to produce a mold

in which can be cast a solid or hollow form other than flat, thereby obtaining a differently-formed product from the original pattern.

In the utilization of the elastic mold, with its pouring-head, in combination with its sectional casing, as seen in the sectional view Fig. 7, it will be found that the pouring-head and sectional casing play a very important part in connection with the mold proper in the production of many of its products, such as in the formation of a solid product, which is made of a material which will shrink in cooling, setting, or drying, or a hollow product, which is formed by the process of pouring the material in and out of the mold, and are especially valuable where the hollow reproduction is to contain a core with or without its proper core-irons, as desired. In the latter case the sectional casing can be made to support the core-irons in the most effectual way possible while the core is being formed within the reproduction. While the core-irons are not necessary to a reproduction which is formed in the elastic mold and constitutes the finished article, they are necessary when the reproduction is to act as a pattern about which a mold is to be formed and the reproduction from which is to be hollow. This applies mostly to that class of reproductions which are made of materials which are not easily fusible, and this class of reproductions is one of the most valuable results of the elastic mold.

Where it is desired to form the reproduction of materials which cannot be cast into the elastic mold because the latter would not withstand the degree of heat necessary to fuse said materials, a solid or hollow reproduction of wax, soft metal, or other fusible material is formed in the elastic mold and its pouring-head. This reproduction is then used as a pattern, about which is formed a mold of any comparatively infusible material, said mold to be constructed as a homogeneous whole or in sections, as desired. The pattern is then removed by melting out or otherwise, leaving the mold in condition after it is dried to have cast into it any material desired.

Where a hollow reproduction is required, as above, a hollow reproduction of easily-fusible material is formed in the elastic mold and pouring-head, and a core of the necessary quality, with its proper core-irons, is then cast or otherwise formed in the reproduction, preferably while the latter is still within the elastic mold, this core being used in the final mold as a core for the final reproduction. The pouring-head permits the core to be carried up into it for any desired distance, which distance is generally from one-quarter to one-third of the capacity of the pouring-head, the balance of the space in the pouring-head being filled with the easily-fusible material forming the reproduction and which eventually plays the part of the pouring-head in the future infusible mold. The reproduction containing its core is then used as the pattern for the infusible mold in which the final reproduction is to be cast, said mold being constructed as a solid or homogeneous whole or in sections, as desired. If the former construction is adopted, the core, with its proper core-irons, will form, with this mold, a complete and substantial whole when the first-formed reproduction is removed or melted out and which results in the required space being formed for a facsimile reproduction of the original object.

In some cases a hollow reproduction made of the easily-fusible material and without a core may be used about which to form an infusible mold and the core, either with or without core-irons, afterward constructed within the reproduction and the fusible materials then removed. Also in some cases a core of the proper size and form and with its necessary core-irons may be first constructed, preferably, within a mold of the proper proportions and then placed within the elastic mold and the balance of the space in the mold then filled with the fusible material and the reproduction then treated as previously described.

The method of making hollow castings and the core and casing are fully set forth and claimed in the applications mentioned above.

I claim as my invention—

1. As a new article of manufacture, an elastic mold, the walls of which are of varying thickness, and whose exterior surface follows the general contour of the pattern, substantially as described.

2. As a new article of manufacture, an elastic mold whose inner surface is undercut and whose exterior surface follows the general contour of said inner surface, substantially as described.

3. As a new article of manufacture, an elastic mold, the walls of which are of varying thickness, whose inner surface is undercut and whose exterior surface follows the general contour of the said inner surface, substantially as described.

4. As a new article of manufacture, an elastic mold whose inner surface is undercut and whose exterior surface follows the general contour of the inner surface, said mold being so cut on the parting-line that it can be flexed to permit withdrawal of the pattern and the object reproduced in said mold, substantially as described.

5. As a new article of manufacture, an elastic mold, the walls of which are of varying thickness, whose inner surface is undercut and whose exterior surface follows the general contour of the said inner surface, said mold being so cut on the parting-line that it can be flexed to permit withdrawal of the pattern and the object reproduced in said mold, substantially as described.

6. As a new article of manufacture, a single-piece elastic mold of rubber or other vulcanizable material, whose inner surface is under-

cut and whose exterior surface follows the general contour of the inner surface, substantially as described.

7. As a new article of manufacture, a single-piece elastic mold of rubber or other vulcanizable material, whose walls are of varying thickness and whose inner surface is undercut and whose outer surface follows the general contour of the inner surface, substantially as described.

8. As a new article of manufacture, an elastic mold formed from a pattern in the round, the exterior surface of which mold follows the general contour of the pattern, substantially as described.

9. As a new article of manufacture, an elastic mold of rubber or other vulcanizable material having abutting surfaces within the cavity, substantially as described.

10. As a new article of manufacture, an elastic mold of rubber or other vulcanizable material whose inner surface is undercut and whose exterior surface follows the general contour of said inner surface, said mold having abutting surfaces within the cavity, substantially as described.

11. As a new article of manufacture, an elastic mold with parts that are partially separated from the main body of the mold by open spaces, said parts being connected through the open spaces by comparatively thin walls constituting supports for the said parts, substantially as described.

12. As a new article of manufacture, an elastic mold with parts that are partially separated from the main body of the mold by open spaces and connected through said open spaces by comparatively thin walls constituting supports for said parts, said parts being open through the connecting-walls to allow for the removal of the pattern, substantially as described.

13. As a new article of manufacture, an elastic mold of vulcanizable material, having a rib on its outer surface through which the mold is parted, substantially as described.

14. As a new article of manufacture, an elastic mold of vulcanizable material having a rib located at the line for division of said mold and divided through said rib to allow removal of the pattern, substantially as described.

15. As a new article of manufacture, an elastic mold having a pouring-head formed integral therewith, substantially as described.

16. As a new article of manufacture, a mold of rubber or other vulcanizable material, having a pouring-head and internal abutting surfaces and partially severed to allow removal of the original and reproductions, substantially as described.

17. As a new article of manufacture, a mold of rubber or other vulcanizable material, the walls of which are of varying thickness, and whose outer surface follows the general contour of the pattern, and provided with a pouring-head, said mold having abutting surfaces and partly severed to allow removal of the original pattern and the reproductions, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JESSE F. SPENCER.

Witnesses:
WILL. A. BARR,
FLORENCE HILLMAN.

Plaintiff's Exhibit P-19

J. KRALUND.

METHOD OR ART OF MAKING COMMERCIAL CASTINGS.

APPLICATION FILED JAN. 8, 1916.

1,238,789. Patented Sept. 4, 1917.

Fig. 1.

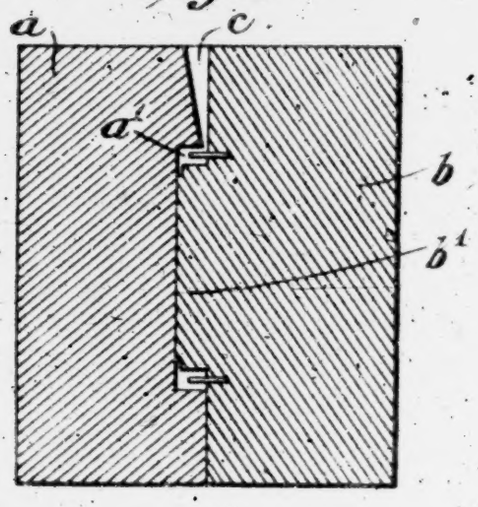


Fig. 2.

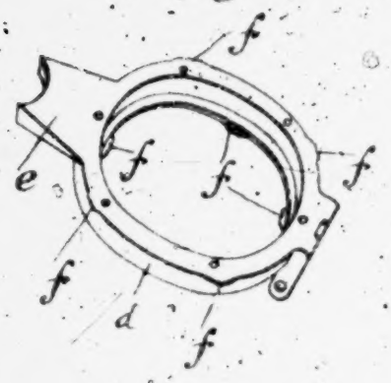


Fig. 3.

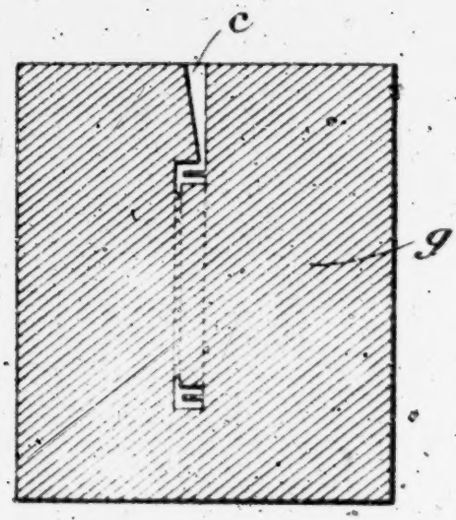
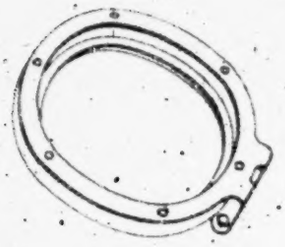


Fig. 4.



Attest:

E. Mitchell

John Kralund Inventor:

by Frank P. Wentworth

his Atty

Plaintiff's Exhibit P-19

UNITED STATES PATENT OFFICE.

JOHN KRALUND, OF BROOKLYN, NEW YORK, ASSIGNOR TO DOEHLER DIE CASTING COMPANY, A CORPORATION OF NEW YORK.

METHOD OR ART OF MAKING COMMERCIAL CASTINGS.

1,238,789. Specification of Letters Patent. Patented Sept. 4, 1917.

Application filed January 8, 1916. Serial No. 70,917.

To all whom it may concern:

Be it known that I, JOHN KRALUND, a citizen of the United States, residing at the borough of Brooklyn, in the city of New York, county of Kings, and state of New York, have invented certain new and useful Improvements in the Method or Art of Making Commercial Castings, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to a method or art of making commercial castings and more particularly to such a method which is especially adapted for the production of castings of large bulk, requiring no machining after completion to bring them to size, or give the desired finish thereto.

Heretofore the production of castings of the character which I contemplate producing by my method have been made by what is known as the "pressure die casting process," consisting of the injection of a molten metal into a metal mold or die, sufficient pressure being used to rapidly force the metal into all parts of the cavity in the mold or die. Such castings are ordinarily of more or less complicated design and the molds or dies used in the production of the same usually have metal partitions of small bulk and metal cores either fixed or movable about which the heated metal must flow and set. When castings are made of high fusing metals such as aluminum, aluminum alloys and copper alloys, the cost of production is materially increased by reason of the rapid destruction of the mold from the high temperatures about the partitions and cores in the mold, and irrespective of the character of the alloy, the pressure die process is limited to the production of comparatively small castings because of the tendency of the metal when setting to shrink upon the obstructions within the mold or die in a manner to have a tendency to form concealed cracks. In a small casting it is possible to handle the apparatus with sufficient rapidity to avoid these conditions, but with larger castings it has heretofore been found impossible to avoid this condition. When I refer to small castings I refer to those castings, the weight of which is from two to three pounds or less.

By the method of my invention, I am enabled to produce castings of larger bulk than is possible with the pressure die casting process, which castings as to dimensions and finish will be substantially like castings made in metal dies, the finish and dimensions of these castings, in fact, being determined by or through the agency of the pressure die casting process. By my improved method I avoid the wastage due to the destruction of the die from the high temperatures of the metal used in making the casting and am thus enabled to increase the product of a single die to a point beyond that which is now possible even when the die is used for making castings made of comparatively low fusing alloys.

I secure the desired results by the use in rotation of certain steps and practices, some of which are old and well known in the art of making dental inlays, the method or art of my invention differing from those heretofore practised in that the basis of the method or art of my invention is the production of a large number of patterns by the pressure die casting process and in a steel mold, each of which patterns will be the exact replica of every other so as to permit the production of a large number of commercial castings in all respects resembling those which result from the use of the master die with conditions used by the ordinary methods practised in the pressure die casting art.

The primary object of the invention is to produce such castings under conditions whereby the mold or die will not be injuriously affected by the shrinkage, or by the high temperatures of the metal. A further advantage of the method or art of my invention is that in the production of patterns of a material, the fusing point of which is very much lower than the fusing point of any metal suitable for use in machine parts, this material may be selected with the view of avoiding those high temperatures and that shrinkage which is injurious to the die and to the finished product. Incidentally the finished casting will not have any fins thereon, or any indications of the parting line of the die sections, since the patterns themselves may be finished to obliterate all traces thereof. By reason of the character of the material which may be used in making the patterns above referred to, there are substan-

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tially no limitations upon the size of castings which may be made. In the production of dental inlays and in the production of similar articles whereby only one article is required, the conditions above referred to do not enter into the method. It is merely necessary to approximate the dimensions required in the casting and there are no cores or obstructions to be taken into consideration. In fact none of the conditions found in the dental art are present in the art of making commercial castings for machine parts used in different mechanisms. The nature of the product is different and the metals used in the commercial casting art have entirely different characteristics from those used in the dental art.

The invention consists in the method or art of making commercial castings consisting in forming a pattern by forcing molten material having a low fusing point into a metal mold or die, the cavity of which corresponds with the casting to be made, forming a mold by inclosing the pattern so made in a mass of plastic material, subjecting the low fusing material of said pattern through said plastic material to heat at a temperature sufficient to fuse the material of said pattern and causing said material to flow from within said mass of plastic material while in the molten state, thereafter filling said plastic mold with molten metal having a fusing point comparatively higher than the material of said pattern, whereby a finished casting is produced and removing the plastic material from about said finished casting; and in such other novel steps and practices as are hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—

Figure 1 is a sectional view of a metal mold or die for making a plurality of identical patterns;

Fig. 2 is a view of a pattern made therein;

Fig. 3 is a sectional view of the plastic mold formed from said pattern; and

Fig. 4 is a view of the finished casting.

Like letters refer to like parts throughout the several views.

In the practice of my method or art, I make a sectional mold or die having sunk therein a cavity, the contour and dimensions of which correspond with exactitude to the casting to be produced. The two parts of said die in the accompanying drawings, are indicated at *a*—*b*. At *c* I have indicated the ingate of the said mold or die. This die is adapted for use in an ordinary pressure die casting apparatus, by means of which the cavity formed by the portions *a'*—*b'* of the mold sections *a*—*b* is filled with a low fusing material such as wax, or a metal alloy having a low fusing point, to form a pattern which may be used in making a mold from suitable plastic material such as plaster of Paris or gypsum. The material of which this pattern is made may vary according to the temperature conditions, and the size or intricacy of the casting to be made.

The die *a*—*b* is provided with the usual vents and the contact of the molten wax or other material forced into the mold or die under pressure, with the walls of the mold or die will have a tendency to give the pattern a sufficiently hard surface to permit its handling in making the plastic mold and in finishing the pattern prior to the making of said plaster mold. This finishing consists mainly in removing any fins at the line of demarcation between the mold sections or at the vent openings therein.

The pattern thus produced in the metal mold or die and the fins thereon will have the characteristics shown in Fig. 2 of the drawings, *d* being the body of the pattern, *e* the sprue formed in making the pattern, and *f* the fins above referred to.

A suitable mold of plastic material is then formed about said pattern including the sprue *f* thereof, which sprue is allowed to extend through the wall of the plastic mold so as to form an ingate for the fluid metal and at the same time permit the escape of the material of the pattern. When the plastic material has solidified or set sufficiently, it is subjected to a heat at a temperature slightly above the fusing point of the material of the pattern, this metal when melted escaping through the opening formed by the sprue *f*.

If wax be used for the pattern, a portion thereof might be absorbed by the plastic material but this would not in any way, affect the casting unless it were to close the pores sufficiently to avoid any possible granular surface effect. When a low fusing metal is used instead of wax, no such condition is present.

When the plaster mold has been thus made, metal having the desired properties for a finished casting is poured or otherwise introduced into this plastic material, as by means of a pressure die casting apparatus in which metal is cast under very low pressures, the ordinary die casting method of die pressures being impracticable with a mold as fragile as the one above referred to. After the casting has been thus made the plaster mold may be broken to permit the drawing of the casting.

The rapidity with which a large number of patterns may be made, and the small wastage of the material of which said patterns are made, make it commercially practicable to produce castings by this method providing such castings are of sufficiently great bulk. The method, however, is not particularly adaptable to the production of

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small castings by reason of the relatively greater expense as compared with a pressure die casting.

By reason of the fact that the pattern is finished before the plaster mold is made therefrom, practically no finishing of the completed casting is required excepting the removal of the sprue, and of any plaster confined within the openings in the casting. By using a plaster mold the shrinkage of the metal is of secondary importance since allowance for such shrinkage is ordinarily made in making the metal mold or die, and the plastic entering into the mold in which the finished casting is made does not possess sufficient resistance properties to injuriously affect the casting.

In making complicated castings, it is sometimes necessary to apply slight pressure to the molten metal while it is flowing into the plaster mold.

While in the practice of my method or art, all of the steps above referred to are essential in producing satisfactory commercial castings, that step which is of primary importance being the first step, or the production of the patterns in a metal mold or die, since this step permits any desired multiplication in the number of such patterns without variation in the dimensions and surface conditions of the pattern. As stated above, the pattern may be made either of wax or of a low fusing metal, the latter being preferable where the design of the casting is at all intricate, or possesses projections of small dimensions, which might readily be broken from the pattern in finishing the same and making the plaster mold therefrom.

It is not my intention to claim broadly the making of a plaster mold about a fusible pattern and the evacuation of said mold by subjecting it, and the pattern therein contained, to a temperature which will fuse the pattern. What I desire to claim is a method utilizing these old practices, and in conjunction therewith the dominant and essential step of preparing the pattern in a metal mold; which step is essential in the production of commercial castings by reason of the necessity for the rapid production of accurate patterns, each of which is an exact replica of every other.

In making commercial finished castings, it is necessary to produce the same in large numbers and hence the rapid production of patterns, the design and surface characteristics of which coincide with those desired in the finished castings, is of primary importance.

Having described the invention what I claim as new and desire to have protected by Letters Patent is:—

1. The method or art of making commercial castings consisting in forming a pattern by forcing molten material having a low fusing point into a metal mold or die, the cavity of which corresponds with the casting to be made, forming a mold by inclosing the pattern so made in a mass of plastic material, subjecting the low fusing material of said pattern through said plastic material to heat at a temperature sufficient to fuse the material of said pattern, causing said material to flow from within said mass of plastic material while in the molten state and thereafter filling said plastic mold with molten metal having a fusing point comparatively higher than that forming said pattern whereby a finished casting is produced and removing the plastic material from about said finished casting.

2. The method or art of making commercial castings consisting in forming a pattern corresponding in contour with the casting to be made and having an integral sprue thereon, by forcing molten material having a low fusing point into a metal mold or die under sufficient pressure to insure the filling of said mold or die and the desired density in the pattern, forming a mold by inclosing the pattern so made in a mass of plastic material, subjecting the low fusing material of said pattern through said plastic material to heat at a temperature sufficient to fuse the material of said pattern, and causing said material to flow from within said mass of plastic material while in the molten state and thereafter filling said plastic mold with molten metal having a fusing point comparatively higher than that forming said pattern whereby a finished casting is produced, and removing the plastic material from about said finished casting.

In witness whereof I have hereunto affixed my signature in the presence of two subscribing witnesses, this 23d day of December, 1915.

JOHN KRALUND.

Witnesses:
A. S. HUNKELE.
F. T. WENTWORTH.

Plaintiff's Exhibit P-19

May 29, 1923. 1,457,040.

J. A. McMANUS

CASTING MACHINE

Filed Oct. 11, 1919

Fig. 1.

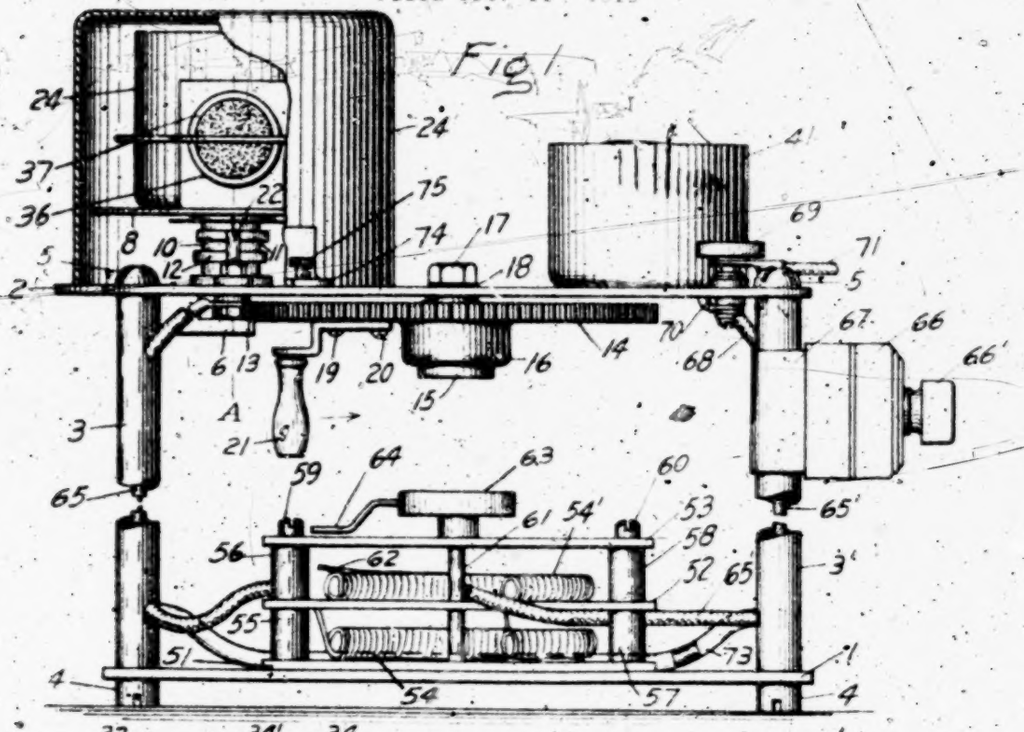


Fig. 2.

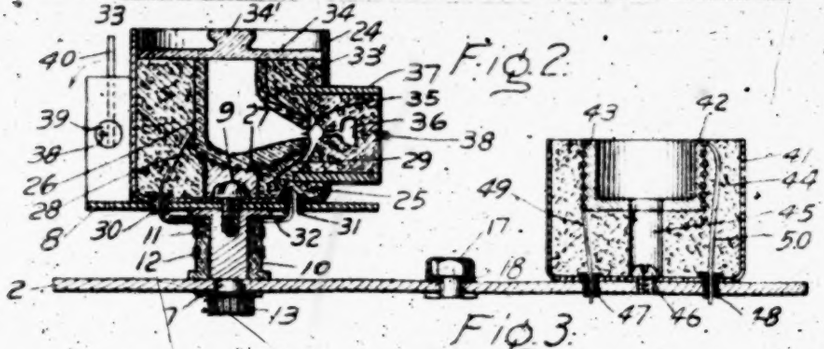


Fig. 3.

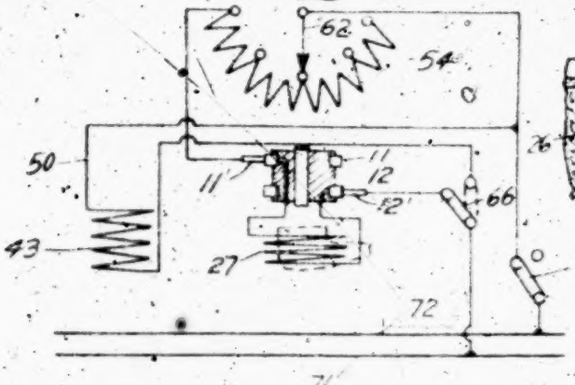
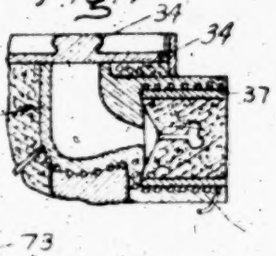


Fig. 4.



Inventor,

John A. McManus

Patented May 29, 1923. 1,457,040

UNITED STATES PATENT OFFICE.

JOHN A. McMANUS, OF LYNN, MASSACHUSETTS.

CASTING MACHINE.

Application filed October 11, 1919. Serial No. 330,151.

To all whom it may concern:

Be it known that I, JOHN A. McMANUS, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Casting Machines, of which the following is a specification.

The present invention relates to casting machines of the electrical type and embodies certain improvements, both mechanical and electrical, over the construction shown in my previous inventions, the subjects of Patents Nos. 1,015,818 and 1,015,819, respectively, both of which patents were issued January 30, 1912.

While the machine illustrated in this application and those illustrated in my former patents have been designed more with a view to their utilization in connection with the making of dental castings, such as for inlays, crowns, bridges, porcelain work, etc., the same principle, with slight modifications in the structure of the apparatus, may be equally as well applied to the casting of jewelry, such as gold rings, small trinkets, etc., where metal or other dies or moulds may be used to be filled by centrifugal casting methods, and, of course, if larger scale operations are desired, suitable modifications in design will readily adapt the apparatus to such purposes.

The machine of the present invention is more particularly an improvement over the previous design illustrated in my Patent No. 1,015,818, in that in the resistance furnace type of centrifugal casting machine I have succeeded in producing a machine which is adaptable to both alternating and direct current supply circuits; and which at the same time is light in weight and more simple in operation. In the machine shown in Patent No. 1,015,818, an alternating current transformer was necessary to furnish current to the crucible or furnace at about 4 or 5 volts and about 100 amperes. The machine was limited in its application to alternating current circuits only. A motor was also employed to rotate the machine. The whole equipment, therefore, machine, transformer, and motor was relatively heavy. In the present improvement I have succeeded in making a machine which is not only adaptable to both alternating or direct current supply circuits, but one which eliminates the need of a transformer or other current changing device and also of a motor, and is, therefore, light in weight and simple in its construction and operation, the whole outfit weighing approximately only 9½ pounds, as against about 50 pounds for the previous machine. One of the essential factors contributing to the success of such a machine is the employment of a crucible or furnace having suitable refractory properties, chemical inertness where precious metals are fused therein and for other special applications, and which is adaptable to being heated without the necessity for using an unduly heavy current or large energy input in proportion to the work to be performed. While the carbon crucible of my previous patents has the other desirable properties it requires to be run at a high current density. I, therefore, after a number of years of patient research and failures in the enduring qualities of the furnace heating means, have succeeded in producing a crucible of such material and proportions of winding as to successfully fulfill the objects to be attained. A successful crucible or furnace element was finally made by using a crucible of "alundum" suitably grooved around the sides and bottom for the reception of a winding in the nature of a platinum coil wound into a helix. This helix is formed by winding the platinum wire on a mandrel of suitable size and then stretching the coil thus formed to avoid any possibilities of short circuiting between adjacent turns of the helix. The helix is then wound into the grooves, covered in by "alundum" cement and allowed to harden and gradually sintered by slow heating with the electric current passed through the helix up to the working temperature. Many adjustments as to length of helix, section of platinum wire, and distribution of the wire around the working portion of the crucible had to be made before the proper relations could be established and a crucible produced which would have a long life. In fact, the experiments involved covered a period of several years of construction and testing, before long

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lived crucibles were obtained, which would give efficient results with the least expenditure of money, when dealing with such an expensive resistance wire as platinum, or the like.

Another object of the invention, also, is to provide a resistance type of furnace, wherein the furnace itself is mounted on the central axis of rotation, thus enabling the machine to be made of minimum dimensions, and at the same time to allow a high speed of rotation to be quickly attained. This can be done very readily by means of a suitable hand drive, such as by a gear and pinion, by means of releasing a coiled spring, or any other suitable means. This central disposition of the crucible also has the advantage that the metal or material which is fused therein will not leave the crucible to enter the mould until a sufficient force has been developed by the rotation of the crucible to cause the molten material to be forced into the mould under an appreciable pressure, which in turn produces a sound homogeneous casting, after the latter has cooled; free from blow holes, etc.

By the use of a crucible wound with conducting wire of relatively high resistance, such as platinum, for example, I am able to produce the necessary heating effect of the current to fuse the desired metals to be cast, and at the same time eliminate the use of a transformer or alternating current circuits, or to dispense with other current changing devices where direct current is employed. While platinum is at present somewhat expensive, the amount used for the particular work to which the machine is applied is not prohibitive; and the elimination of a transformer or other special devices, and the ease and facility of operation of my improved machine, warrant its use. Also, for lower temperature work, where gold or silver is not employed as the casting material, resistance wire of cheaper grade may be used with which to wind the crucible, such as "nichrome," or "calorite" resistance wire. For certain high temperature applications, such as for the reduction of high fusing porcelain in the furnace, it may be desirable to use a resistor having a higher melting point than platinum and in such case means for heating the mould may also be desirable. I have shown a modification in the accompanying drawing employing such means.

While I have in the present embodiment of my invention elected to use centrifugal force to transfer the fused material from the furnace into the mould, I do not limit myself entirely to dependence upon centrifugal means to make this transfer. The same result could be accomplished, for example, by shocking the molten material into the mould, such as by releasing a spring attached to the furnace in a manner to displace the fused material and cause it to move through the furnace opening into the flask and mould, or by using my electrically heated crucible or muffle in conjunction with a vacuum machine and sucking the casting material into the mould after it has been fused.

In the specific form of my invention, as adopted by me, I have used crucibles of "alundum," but "zircite," quartz, or any other refractory material, suitably shaped and wound, may be used, provided it meets the requirement of chemical inertness where such property is desirable.

Still another object of my invention is to combine in my improved casting machine an electrical heating means for melting or evaporating out the disappearing wax model invested in the casting flask.

In the application of my machine to the casting of dental inlays, particularly, I have found that the melting out of the so-called "disappearing wax model" electrically gives far better results than any other method heretofore used. Ordinarily, this model or pattern is melted out by putting the flask containing the same into or over a gas flame and endeavoring to regulate the amount of heat and the time consumed in the process by adjusting the gas flame. In the melting out of these wax models it is very essential that the result be accomplished slowly and evenly, in order that the contour or margins may not be broken down, but may be retained sharp, clean-cut, and true to the original. This result is very difficult to accomplish by ordinary gas flame heating. It is quite obvious that with an electrically heated baking cup the winding can be properly proportioned, or the control of the heating be almost perfect by means of a rheostat or taps taken from the winding. Thus the wax model or pattern may be gradually absorbed by the investment material, or evaporated.

The specific embodiment of the desirable features of my improved electrical casting machine will be more clearly illustrated by reference to the accompanying specification and drawings, in which Fig. 1 represents a side elevation of my improved casting machine with the furnace cover partly broken away and the hollow supporting posts broken away to show the method of wiring; Fig. 2 represents a vertical section on the line *a*—*a*, Fig. 1 showing the construction of the crucible, or furnace, and the wax dissolving device; Fig. 3 is a diagram of the electrical connections; and Fig. 4 a modification showing the heating of both the crucible and mould.

Referring more in detail to the drawings, 1 and 2 represent suitable plates of thin sheet steel supported by four hollow steel posts 3, one at each corner of the plates 1 and 2, the

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posts 3 extending into holes in the plates. The posts 3 are tapped to receive filister head screw-threaded feet 4, or if desired these feet may be made of insulating material. The posts are secured at the top plate by means of the screws 5. Supported in the bearing block 6 is a shaft 7 which shaft extends through the plate 2, and is suitably secured at the top to a flat disk or plate 8 by means of a screw 9 and lock washer, or by any other obvious means to secure the shaft and disk against relative movement. Mounted on the shaft 7 is a block of insulating material 10, which may be made of some suitable wood, such as maple, or better still, of the well-known electrical insulator "bakelite." Moulded into the insulator block 10 are two collector rings of relatively thin copper or brass 11 and 12. The collector rings may be given a coat of silver plating, in order to prevent corrosion and poor contact. If the collector rings 11 and 12 are not moulded into the insulating block 10, or rather, if the insulating block 10 is not moulded about them, they may be made jointed, provided a good silver-soldered joint is obtained. Suitably mounted on the lower part of the shaft 7 is a small pinion 13 spaced from the bearing block by a thrust washer (not shown). Meshing with the pinion 13 on the under side of the plate 2 is a large gear 14 having a ratio of about 10:1 in relation to the pinion. This gear is supported by means of the shaft 15 and hub 16, the shaft 15 extending through a hole in the plate 2 and secured at the top of the plate by a nut 17 and lock washer 18. Secured to the gear 14 by screws 19 and 20, or other suitable means, is a handle 21 for turning the gear by hand and consequently enabling the furnace or crucible element to be rotated at a fairly high speed. While I have used a gear drive, of course, any suitable driving means may be used, such as a wound-up clockspring attached to the shaft 7. Also mounted on the plate 2 are two brush holder studs, one of which is shown at 22, which carry thin copper or bronze brushes for engaging the collector rings 11 and 12. 24 represents a furnace or crucible container which may be made of a spinning of thin sheet metal, such as sheet steel, and made in the form of a cup having a closed bottom and open top. This cup may be secured to the disk or plate 8 by means of the same screw 9 which secures the shaft 7 to the disk 8, or the cup and disk may be made in one piece, as desired. A cradle 25 of insulating material, such as "bakelite" or asbestos board is laid on the bottom of the cup 24 and serves as a support for the crucible 26, the latter being made of any suitable material which will stand the temperatures involved. In the present instance I have made this crucible of "alundum," a trade product of the electric furnace, which is practically pure fused alumina, and furnished in desired shape, upon request, by the manufacturers of such materials, the material being formed and sintered at high temperatures, thereby having a very negligible expansion coefficient and subject to very little tendency to cracking. The crucible, however, may also be made of such materials as "zircite," fused quartz, or other materials somewhat analogous in refractory and chemical properties. One of the desirable characteristics of such a crucible for dental applications is that it be chemically inert to silver and gold of relatively high karat quality. (22 karat for example), as it is desirable that the casting materials used do not combine chemically with the material of which the crucible is composed, or with the platinum winding, when platinum is used as the resistance wire. Moulded or ground into the bottom of the crucible 26, and a short distance up the sides thereof, are suitable grooves for the reception of a helix of high resistance wire 27. In the present instance I have chosen platinum as the wire of which to make the helix, on account of its relatively high resistance and high melting point. This helix is wound on a suitable mandrel until a length of the required proportions has been obtained, the section of wire also being chosen which will give long life, without burnouts. When the helix is slid off the forming mandrel, the adjacent turns are carefully stretched to give them a set which will avoid short circuiting of the turns, or the helix may be wound on the mandrel by means of a spacer wire between the turns. The helix is then laid into the grooves formed in the crucible, and wound therein, being secured temporarily by an elastic band. A number of coatings or paintings of insulating cement, such as "alundum" cement, is then spread over the wire, each coat being allowed to dry before the next one is applied, etc., until a sufficient thickness has been obtained. Leads 28 and 29 are then secured to the ends of this helix, which leads I choose to make about twice the section of the helix itself, in order to have a long life. This has been found by experiment to be desirable. While I also make these leads of platinum of relatively short length and thick section, it is conceivable that heavy leads of cheaper material than platinum may be employed, such as heavy copper leads, for example. Electric current is then passed through the leads and helix slowly increasing in value up to the working temperature, in order that the insulating cement may be sintered or rendered relatively homogeneous with the crucible itself. Insulating bushings 30 and 31 are inserted through the cup 24 and disk 8, through which bushings the leads 28 and 29 are passed and connected to the collector rings. An insulating disk of mica or other

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suitable insulator 32 is inserted over the collector ring block, and this effectively prevents any possibility of the leads 28 and 29 coming in contact with any metal parts as they are carried to the collector rings. One lead, such as the lead 28, for example, is carried through the bushing 30 under the insulating ring 32 and silver-soldered, brazed or otherwise properly secured to the top ring 11. The lead 29 is passed through the bushing 31, under the insulating ring 32, and down through a hole in the collector ring block to the lower collector ring 12, where it is also properly secured to the latter. While the connection of the heavy leads 28 and 29 is shown as being made inside the container 24 in a temporary manner, as by small nuts and washers, a permanent joint may be made at the helix itself, and a temporary joint made outside, that is, underneath the container 24, where the joint will be more accessible in case a repair should be necessary. A packing of insulating material, such as asbestos wool, silicon, monoxide, or other suitable heat non-conductor 33 surrounds the crucible 26 in the container 24, in order to thermally insulate the crucible and minimize loss of heat. An insulating cover 34, with a little knob or handle 34', is provided to lie over the top of the crucible for the same reason. This cover can be removed at will to inspect the condition of the casting material in the crucible, and determine when said material becomes fused or melted. The crucible 26 is formed with a mouth or spout 35 and with gradual rise from the bottom of the crucible to the spout, in order that a certain minimum effect of centrifugal force will be generated before the gold or other casting material will leave the crucible prior to entering the mould 36 in the flask 37. This ensures that a certain initial force is involved before the casting material starts to enter the mould. The flask 37 may be the conventional casting ring used in dental inlay casting, that is, a cylindrical shell, open at both ends, and previously prepared and filled as described in my former patents above mentioned. In order to retain the casting ring or flask in place, in operative relation with the crucible 26, a hole is provided in the cup 24, of suitable dimensions to receive the flask 37, and a bail wire 38 extends around the cup 24 and flask 37 in a manner to retain said flask from flying out by the action of centrifugal force. The bail wire 38 is tightened and loosened at will by means of an eccentrically disposed cam 39, through which the wire 38 extends. This cam is operated by means of a lever 40, which may be pushed up or pulled down in the direction of the arrow.

Referring to the wax dissolving device, 41 represents a thin shell of sheet steel spun into the form of a cup, in which cup is mounted a core of suitable insulating material, such as soapstone, or artificial composition held together with a binder and fused or baked at the proper temperature. This core, which is represented at 42, has formed in its outer surface a spiral groove for the reception of a helix 43. This helix is previously formed on a mandrel in a similar manner to the platinum helix 27, but is made of "nichrome," "calorite," or other high resistance alloys suitable for moderate temperatures, and in this case suitable for producing a temperature sufficient to melt the wax model or pattern by conduction or radiation of heat into the flask 37, when the latter is inserted to rest in the core 42. Surrounding the core 42 and helix 43 is a body of insulating material 44, which may be either a solid block into which fits the core 42, or this insulating material may be powdered or granular, packed into place. Assuming that it is solid, which is the preferable form, an opening 45 is cut or bored through the core 42 and block 44, large enough so that a small screw-driver can be inserted through the core 42 from the top and thus the cup 41 and block 42 secured to the plate 2 by means of the screw 46. Two insulating bushings 47 and 48 are inserted through the bottom of the cup 42 and holes formed in the block 44, through which the leads 49 and 50 are taken out.

On the lower plate 1 is mounted a small rheostat comprised of the three insulator plates, 51, 52 and 53 between which is suitably supported a coil of high resistance wire 54, 54'. Again, this coil is made of "nichrome," "calorite," or any other well known resistance wire which will withstand temperatures up to a low red heat, the coil being fastened to the insulator plates and the upper portion 54' being continuous with the lower portion 54. A hole in the plate 52 permits the coil to be strung through to the compartment between the plates 52 and 53. The plates 51, 52 and 53 are spaced apart by means of the insulator bushings 55, 56, 57 and 58, and four corresponding bushings at the back corners of the plates (not shown). Through these bushings extend studs 59, 60 and the two rear studs (not shown). The studs are screwed into tapped holes in the plate 1 to receive them. A shaft 61 is journalled in the plates 51, 52 and 53, to which shaft is attached a contact spring member or arm 62, which has a sliding contact engagement with the upper portion of the coil 54'. A hard rubber handle 63 is suitably fastened to the shaft 61 and this handle carries an indicator needle or pointer 64, in order to determine the position of the contact arm 62 and consequently to indicate the amount of resistance which is cut in or out of circuit. The insulated conductor of copper wire 65 is connected to

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the brush-holder stud 22 and passes through the hollow supporting post 3 to the rheostat where it is connected to one side of the latter in series, the other side of the conductor 65' being connected to the opposite end of the rheostat from which it is carried through the corresponding hollow supporting 3' to a switch 66 mounted on the switch plate 67, the latter being supported on the right hand supporting posts. From the switch a connection 68 is carried to the under side of the binding post 69 and still another connection 70 is connected to the lead 49 of the wax dissolving unit carried in the cup 41. A similar connection (not shown) is connected to the lead 50 to another point on the switch 66. 71 and 72 represent the main supply wires connected to the binding post 69 and its corresponding binding post in the rear (not shown). From this latter binding post is carried a conductor, which is strung through its corresponding hollow supporting post and through the hollow tube 73 in the rear of the machine, and from thence to the rear brush-holder stud, the current passing through the brush, through the collector ring and crucible to the opposite brush to the conductor 65, through the rheostat and out through the main 71. The diagram of connections, Fig. 3, will illustrate more clearly the paths of the current in the respective circuits. 71 and 72 represent supply mains for supplying a source of A. C. or D. C. current at preferably 110 volts. 73 represents a switch in the main supply circuit for entirely shutting off the supply of current to the machine. 66 represents the switch Fig. 1 mounted on the machine itself, which switch, in the present instance, controls only two circuits, one through the crucible and rheostat, and the other through the wax dissolving unit. It is to be understood, however, that this switch may have another point giving an "off" position, and thus dispensing with the need for the outside switch 73. In the diagram, 26 represents the crucible and 43 the wax heater, as in the other figures, and 54 the regulating rheostat. 62 represents the spring contact arm on the rheostat and 11 and 12 the slip rings on the collector. 11' and 12' represent the brushes bearing on these respective slip rings.

I will now describe the operation of my improved casting machine:

Assuming that the flask 37 has been prepared in the usual way and the wax pattern 36 inserted therein, this flask is then inserted in the core 42 of the cup 41. The knob 66' of the switch 66 is then turned until it brings the label "wax" before a window opening in the switch. Assuming that the switch 73 is closed, the switch 66 will now be in the dotted line position in the diagram and current will flow from main 71, through switch 66, through the lead 49 of the wax heater, through the wax heater coil 43, out through the lead 50 to the supply line 72. The flask is left in the wax heater until the pattern is dissolved and thoroughly evaporated, when the flask is taken out and inserted in place in operative relation with the crucible 26. The bail wire 38 is pulled up into position to retain it in place, as shown in Fig. 2, and the cam lever 40 tightened. The snap switch 66 is now again turned until the label "gold" appears before the window. This opens the wax heater circuit and closes the crucible circuit. The switch 66 is now in the position shown in full lines in the diagram. The insulating cover 34 is lifted off the cup 24 by means of the knob 34' and gold or other cold casting material dropped into the crucible 26 and the cover again replaced. The current is now flowing from the main 71, through the brush 12', collector ring 12, through the crucible winding 27, through the collector ring 11, brush 11', through the regulating resistance 54, out through the contact arm 62 and finally through the switch 73 and supply main 72, thus completing the circuit. The current is allowed to flow through this circuit until the casting material is fused or molten, which can be determined by occasionally removing the cover 34 and instantly replacing it to prevent loss of heat. A little practice enables one to determine quite readily about the length of time required in accordance with the particular setting of the rheostat for fusing the casting materials. With 22 karat gold, for this particular type of crucible and the resistance all in circuit, the average time is from two to four minutes. When the casting material has become fused or molten, the cover or hood 24' is placed over the rotatable furnace and fastened to the plate 2 by means of lugs 74 and thumb screws 75. This prevents any possibility of danger of rotating parts in case any such should become detached, which occurrence, however, is quite unlikely if the parts are properly made. Conditions are now favorable for casting, and the handle 21 is gripped with the hand and a good vigorous turning of the same for from 15 to 30 seconds (preferably in the direction of the arrow) will cause the crucible 26 and flask 37 to rotate together and cause the casting material in the bottom of the crucible 26 to rise up the incline in the latter and enter the mould 36 with considerable force while in the plastic state, filling the mould under pressure and displacing air bubbles, etc. The current is now turned off by opening the switch 73, and when the rotor is at rest, the cover 24' is removed, the bail wire 38 is released, and the hot flask 37 is withdrawn from its seat by a suitable tool and plunged in water. The finished casting is then taken out and will be found to be a sound, homo-

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geneous casting, free from blow holes, and with fine, sharply defined feather edges, where such existed in the original pattern.

Referring now to Fig. 4, I have illustrated therein a construction wherein I heat both the crucible and the mould simultaneously by the same or by separate windings, as desired, that is, both windings may be in series, or they may be in mulitple circuit, and the crucible winding may be of one material, such as platinum, and the flask winding of platinum, also, or of a cheaper and lower melting material, such as "nichrome," or "calorite," as desired.

While I have shown one specific embodiment of my device, I do not wish to be limited thereto, but desire to cover in the appended claims all modifications falling fairly within the scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a casting machine, the combination of an electrical resistance furnace deriving its heat by means of current passed through an electrical resistance wire in operative relation with said furnace, means for delivering electrical energy to said resistance wire, means for controlling the amount of electrical energy supplied to said furnace, and a means for transferring fused material from the furnace to the mould under the action of centrifugal force.

2. In a centrifugal casting machine, the combination of an electrically heated platinum wound resistance furnace or crucible mounted on substantially the axis of rotation of said machine, a suitable casting flask revolvable with the furnace and in cooperative relation therewith, means for delivering electrical energy to said platinum resistance furnace, a thermal insulating packing around said furnace, and means for revolving the furnace and flask in a manner to cause fused or molten material in the furnace to be transferred to the flask by the action of centrifugal force.

3. In a centrifugal casting machine, the combination of an electrically heated platinum wound resistance furnace or crucible mounted on substantially the axis of rotation of said machine, a suitable casting flask revolvable with the furnace and cooperatively related therewith, a container for the furnace or crucible, a thermal insulating packing between the crucible and the walls of the container, suitable slip rings cooperatively connected with the furnace, conducting brushes in operative relation with said slip rings, brush holders for supporting the brushes, conductors delivering suitable electrical energy to the brushes, means for controlling the temperature of the furnace, and means for transferring molten or fused material from the furnace to the flask by the action of centrifugal force.

4. In a casting machine, the combination of an electrical resistance furnace deriving its heat by means of electric current passed through a resistance wire wound on or in operative relation with said furnace, a mould holding flask also in operative relation with said furnace, means for heating the mould, an opening in the furnace communicating with said flask, and means for forcibly transferring the fused or molten casting material from the furnace through the opening into the mould.

5. In a casting machine, the combination of an electrical resistance furnace deriving its heat by means of electric current passed through a resistance wire wound on or about said furnace, a mould holding flask in operative relation with said furnace, investing compound suitably mixed and hydrated in said flask, a pattern dissolvable by heat invested in said compound, a sprue passage or opening leading from the outer surface of the investing compound to the pattern, a gate for the reception of casting material at the outer entrance to the sprue opening or passage, and means for forcibly transferring the fused or molten casting material from said gate through the sprue opening into the mould formed by the dissolved or evaporated pattern material.

6. In a casting machine, the combination of an electrical resistance furnace deriving its heat by means of electric current passed through a resistance element in operative relation with said furnace to heat the latter to the desired temperature to melt or fuse the charge therein, a container for the furnace, a thermal insulating packing between the furnace and the walls of the container, a mould holding flask in operative relation with said furnace, means for heating the flask by passing electric current through a resistance element in cooperative relation with said flask, means formed in the mouth of said flask for the reception of the casting material to be fused or melted by the furnace after said flask has been charged with the mould, a communicating passage in the flask between the casting material and the mould, and means for forcibly transferring the fused or molten material from the mouth of the flask into the mould.

In testimony whereof I have affixed my signature.

JOHN A. McMANUS.

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June 8, 1937. P. ZAMPOL 2,083,484

FLEXIBLE MOLD

Filed April 24, 1933

Fig. 1.

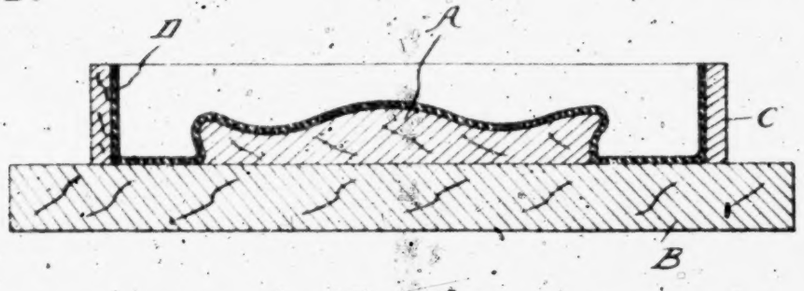

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Inventor

Peter Zampol

Whittemore Hulbert

Whittemore & Belknap

By

Attorneys

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Patented June 8, 1937 2,083,484

UNITED STATES PATENT OFFICE

2,083,484

FLEXIBLE MOLD

Peter Zampol, Detroit, Mich., assignor to Permaflex Mold and Model Corporation, Detroit, Mich., a corporation of Michigan

Application April 24, 1933, Serial No. 667,709

8 Claims. (Cl. 18—47)

The invention relates to flexible molds of that type permitting removal from the molded article without the necessity of the draft required with all rigid molds. Heretofore such molds have usually been formed of rubber which when cured is sufficiently soft and elastic to function in the desired manner. I have devised a construction formed of a different material which is even better adapted for the purpose than the rubber and may be manufactured at low cost, and I have also devised an exceedingly simple method of manufacture. To this end the invention consists, first, in the improved construction and second, in the method of manufacturing as hereinafter described.

In the drawing:

Figs. 1, 2 and 3 are cross sections showing the several stages in the manufacture of a flexible mold of my improved construction;

Fig. 4 is a similar view showing the manner of removing the molded article from the mold;

Fig. 5 is a view similar to Fig. 3 showing a modification.

For perfectly reproducing the pattern it is essential that the surface of the mold in contact therewith should exactly conform thereto and should be sufficiently tenacious, elastic and limited in adhesiveness to permit of stripping off intact. I therefore form this portion of the mold by applying to the face of the pattern a compound having a relatively large rubber content and which is preferably applied by spraying. Specifically, I employ a compound the chief ingredient of which is latex and which is associated with certain other materials such for instance as casein glue, which modify its characteristics to conform to those above described. This surface portion must then be reinforced by a body having sufficient rigidity to hold the mold in form during the casting process, but nevertheless having sufficient elasticity and flexibility for removal from the pattern even where the latter has undercut portions. For this body portion I may employ different materials, among which are first, the same material as is used for the surface, having incorporated therein a relatively large amount of filler, such for instance as wood flour; second, a gelatinous body of a consistency possessing the required flexibility and elasticity.

Various gelatinous bodies having the proper water content are suitable for forming a matrix or mold and possess the required flexibility and elasticity. However, such material is not suitable for forming the entire mold, as it is too adhesive and is lacking in the tenacity required for easily stripping from the face of the pattern. Moreover, such gelatinous compounds will gradually lose their water content, thereby changing in form and becoming rigid. I have discovered that by first forming the surface portion of the mold of the latex compound above described and then reinforcing this by a gelatinous compound which is completely enveloped in a waterproof skin, I obtain a mold permanently retaining the desired characteristics.

As shown in Fig. 1, A is a pattern which may be laid upon a base B and provided with a surrounding flask ring C. The surface of this pattern as well as the inner face of the flask is then coated by being sprayed with my latex compound to form a skin D thereon. After this has dried, the flask is filled with a gelatinous body E as shown in Fig. 2 and the upper surface of this body is then covered with a complementary portion of the latex skin as indicated at F, Fig. 3. This will complete the structure which is then capable of use in the molding of exact reproductions of the pattern as shown in Fig. 4. After the plastic material placed in the mold has hardened, the mold is removed by flexing it which withdraws all undercut portions and progressively strips the latex skin from the molded surface.

A formula suitable for forming the protective skin comprises commercial latex having a water content of from 40% to 45%; casein glue from .25% to 5%; coloring matter from 1.2% to 2.5%; chrome alum (chromium and potassium sulphate) from 1% to 10%.

The gelatinous body may be formed from the common commercial glues having an additional water content of 5% to 30%.

In the modified construction shown in Fig. 5 the body of the mold is formed of latex compound such as above described to which is added a filler such as wood flour to as high as 50%. This will form a dough or plastic substance which may be spread over the surface coating of the pattern as shown in Fig. 5, at G.

What I claim as my invention is:

1. A flexible mold comprising a skin conforming to the surface of the pattern having an undercut portion; said skin formed of a flexible elastic waterproof material, a reinforcing body for said skin formed of a solid and continuous flexible elastic gelatinous compound and a complementary skin of the flexible elastic waterproof material to completely enclose the gelatinous material and to prevent the same from hardening.

2. A flexible mold comprising a skin conforming to the surface of the pattern having an un-

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dercut portion, said skin formed of a compound of latex and casein glue in proportion based on the rubber content of the latex of from .25% to 1% of the casein glue, and a reinforcing body of a flexible elastic material.

3. A flexible mold comprising a skin conforming to the surface of the pattern having an undercut portion, said skin formed of a compound comprising latex, casein glue and chrome alum in proportions based on the rubber content of the latex of from .25% to 1% casein glue and from .1% to 5% of the chrome alum, and a reinforcing body for said skin formed of flexible elastic material.

4. A flexible mold comprising a skin conforming to the surface of the pattern having an undercut portion, said skin formed of a compound comprising latex from .25% to 1% casein glue and .1% to 5% chrome alum, and a reinforcing body of gelatinous material completely enclosed in and waterproofed by said latex skin.

5. A flexible mold comprising a skin conforming to the surface of the pattern having an undercut portion, said skin formed of a compound comprising latex formed of .25% to 1% casein glue and .1% to 5% chrome alum, and a reinforcing body of the same material with a filler mixed therein.

6. A flexible mold comprising a skin conforming to the surface of the pattern formed of a compound of latex, a reinforcing body for said skin formed of a solid and continuous flexible elastic gelatinous compound, and a complementary skin of said latex compound completely enclosing the gelatinous material to protect the same.

7. A flexible mold comprising a skin conforming to the surface of the pattern formed of a compound of latex and casein glue in the proportion based on the rubber content of the latex of from .25% to 1% of the casein glue and a reinforcing body for said skin formed of a solid continuous flexible elastic gelatinous compound completely enclosed by said skin and protected thereby.

8. A flexible mold comprising a skin conforming to the surface of the pattern having an undercut portion, said skin being formed of a compound of latex, a reinforcing body for said skin formed of a solid and continuous flexible elastic gelatinous compound and a complementary skin of flexible elastic waterproof material completely enclosing the gelatinous material to prevent the same from hardening.

PETER ZAMPOL.

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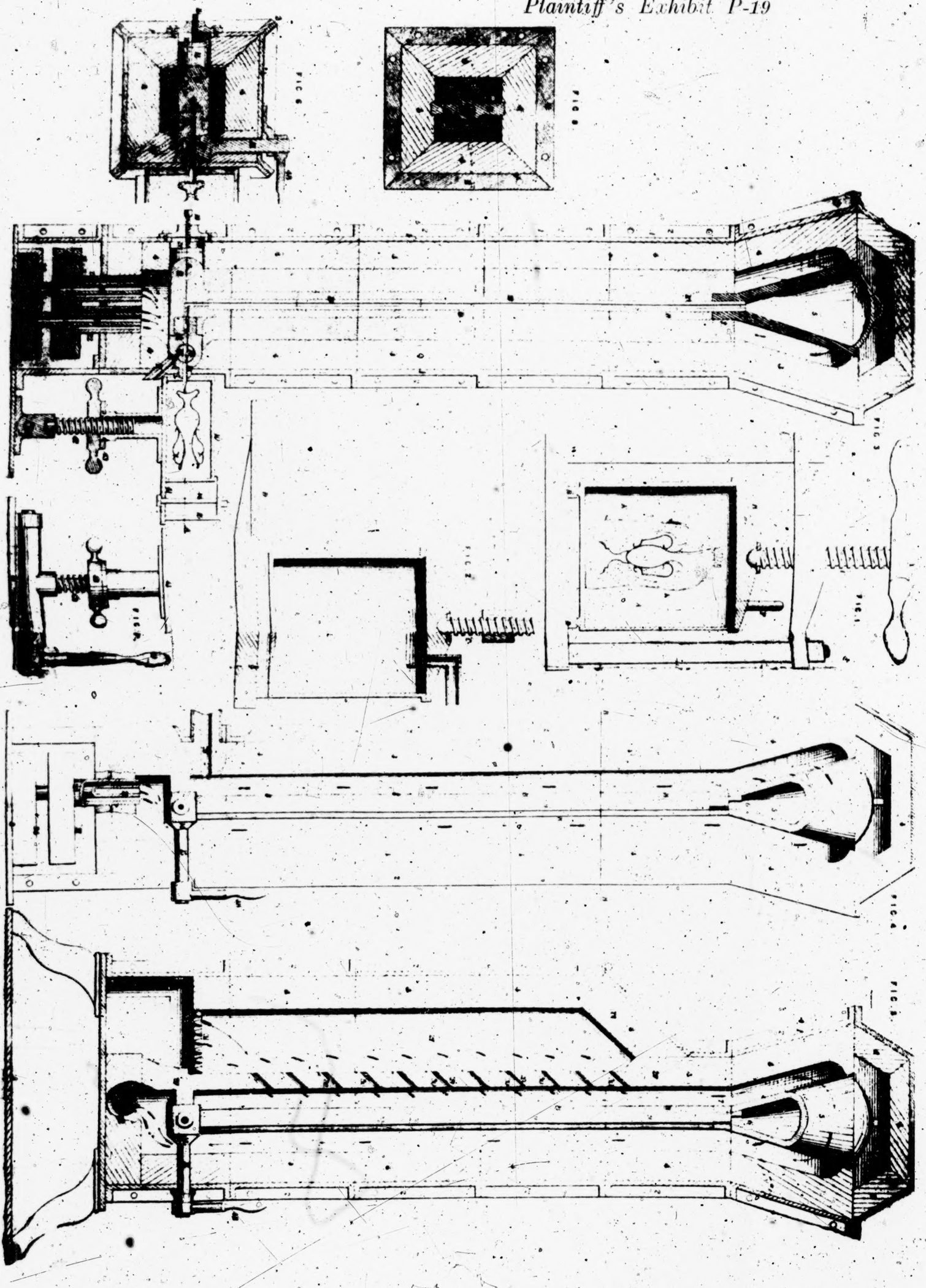

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A.D. 1875.—N° 2467. Specification.

Haseltine's Improvements in Casting Metals.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said George Haseltine in the Great Seal Patent Office on the 8th January 1876.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, GEORGE HASELTINE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eighth day of July, in the year of our Lord One thousand eight hundred and seventy-five, in the thirty-ninth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said George Haseltine, Her special licence that I, the said George Haseltine, my executors, administrators, and assigns, or such others as I, the said George Haseltine, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN THE CASTING OF METALS, AND IN APPARATUS THEREFOR," a communication to me from abroad by Charles Grasser, of Sommerville, Massachusetts, United States of America, Metal Founder, upon the condition (amongst others) that I, the said George Haseltine, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said George Haseltine, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the accompanying Drawing forming a part of this Specification:—

The main object of this Invention is to produce a casting in metal from a given pattern, which casting will be a perfect copy of such pattern without requiring much, if any, after finishing or chiselling

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Haseltine's Improvements in Casting Metals.

work. To accomplish this object it is necessary in the first place to produce a mould or matrix of the pattern or article to be cast as nearly perfect as is possible with material suitable for the purpose.

The said Invention consists in part in a method of making patterns of wax, resin, paraffine, or such like material which will melt at a moderate temperature, or of a composition of such materials, the process of making such patterns being so rapid and easy as to avoid the necessity of drawing the patterns. To produce such patterns of wax or similar material they are cast within pattern moulds or matrices of gum-elastic, which pattern moulds are first formed on an original model and removed therefrom by slitting and stretching. The wax patterns are removed from the matrices in the same way and are then used for forming the permanent clay moulds. This mode of making wax or similar patterns is so rapid and easy as to avoid the necessity of drawing them from the permanent moulds, but permits them to be melted and run from the moulds when done with, and any remainder of such pattern material is consumed in the process of baking the moulds.

The said Invention is not restricted to any shape or form of pattern. It avoids the slow and laborious process of making false cores if the object to be cast be of such a shape as to necessitate the forming of the mould in several pieces, as in the case of a figure or statuette.

In order to produce a mould sufficiently porous to permit the escape of the gases generated, together with the air in the mould, and to permit the metal to lie closely to the surface of the mould after pouring, it has been customary in casting refractory metals to employ for the material of the moulds a coarse loam or sand and to pack it somewhat loosely within the flask.

One object of the present Invention is to permit the use of a more compact and fine loam for the moulds, and of a very fine facing material to produce the surface or portion of the metal which comes in direct contact with the pattern.

The said Invention consists partly in a mode of forming moulds for casting metal by the application to the patterns of a fine slush of fine clay, and coating this with a mantle of less wet and more plastic clay, the surplus moisture being taken up in each case by the application of brick dust or other absorbent material, and the mould being pressed

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on the pattern by enclosing it in an elastic and impervious bag, and applying to the exterior thereof a moderate pressure of air, water, or other fluid within a tight receiver. The fusible pattern is afterwards run from the mould, and the latter is dried and baked.

It will be manifest to those skilled in the art that the use of a dense material for moulds necessitates the adoption of some mode of introducing a metal other than the simple mode of pouring it from a pot or ladle.

The present Invention consists in part in a simple expedient for introducing the molten metal under sufficient pressure. A furnace of peculiar construction is employed in connection with an elevated pot or crucible from which the molten metal descends through a stand pipe constructed of tubular sections, coupled together and with radial flanges for the purpose of fixing the stand pipe concentrically within the vertical furnace, and with a T shaped lower extremity to provide for the discharge of the metal, the vertical height of the column of molten metal determining the pressure at which it is introduced.

The flow of the metal is controlled by a valve forming a permanent part of the apparatus constructed of or encased with a compound of porcelain and black lead, crucible stuff or analogous material which is adapted to bear the necessary high temperature, and also to receive accurate fitting, and to work freely under unequal temperatures. The said valve works within a mouth-piece, also of porcelain and black lead composition formed with a projecting nozzle to deliver the metal to the mould.

The mould and flask are supported on a table adjustable vertically to bring the mould gate in proper juxtaposition with the mouth-piece of the furnace.

Other parts of the apparatus which require accurate fitting and to resist a high temperature are likewise made of black lead, crucible stuff, and porcelain, or equivalent material.

The furnace is heated by means of air and gas introduced from separate reservoirs through separate pipes, or it may be heated by solid fuel.

My method of forming elastic moulds for producing wax patterns [redacted] follows:—The elastic moulds are made of good and elastic vul-

canized india-rubber in the following manner:—India-rubber cannot be vulcanized on every material. If the original pattern or model on which the pattern mould is to be formed be made of any metal which will be acted on by sulphur or sulphurous gases, such original pattern or model must be covered with a deposit of lead or iron, plaster of Paris, parian marble, and all other mineral substances which may be used for making a model are suitable.

If metal is used for making the model iron, type metal, or lead will be preferable. All other metals or compositions must be covered by the electro process with lead or iron.

Such first or original model or pattern from which an elastic mould is to be made ought to be prepared with the greatest care and perfection, as on this first model depends all the perfection and sharpness of every duplicate cast thereafter.

When the first original model is procured the operator takes a solution (properly mixed) of india-rubber in benzine, and with a brush applies over the model or pattern a thin coat of such solution, which soon dries and forms a sticky or pasty surface adapted for the ready adhesion of the vulcanized rubber, which previously is rolled out in thin sheets about $^1/_{32}$ of an inch thick. The first layer of rubber must be laid on very carefully, and every corner or recess in the model must be well filled by small bits of rubber, being carefully forced in with a small stick, care being taken to avoid the confinement of air in any of the recesses. On all smooth or comparatively even parts of the model the rubber may be laid on in larger pieces, but every piece laid on must be firmly pressed on and made to adhere to the model. The first layer or coat of rubber being laid on, all over, and around the model a second layer is added, and so on until the rubber lies on the model to a thickness of about a quarter of an inch. Smaller objects may have a thinner coat, while larger ones require even a much thicker coat. What is to be obtained is a thickness of rubber which will retain its shape after vulcanizing, and bear its own weight without collapsing the elastic mould.

When a sufficient thickness of rubber is laid around the model in the manner described the model with the rubber around it is placed into a rubber vulcanizer (of the construction commonly used for vulcanizing rubber) under water pressure to the rubber for the purpose of firmly

pressing the rubber to the mould or object from which it is to obtain an impression during the process of vulcanizing. Such an apparatus or vulcanizer consists of a strong inner vessel with a closable opening for the introduction of the object to be vulcanized. This inside vessel is surrounded by another strong vessel or steam jacket and connected with a force pump operated outside. The inside vessel contains water for applying high pressure on the rubber by means of the force pump. The outside vessel or jacket contains steam of the required temperature to vulcanize the rubber.

The model must be entirely surrounded by the rubber to prevent the forcing of the water (under a pressure of 100 pounds to the square inch) between the rubber and model which would prevent the rubber from taking a perfect and sharp impression of the model. When the rubber is well vulcanized it is taken from the vulcanizer, and with a sharp knife the rubber is cut in such a way as to permit the removal of the model. It is not necessary to cut the rubber into halves or pieces, because by its elasticity it may, when simply slit, be pulled apart sufficiently to release the model. On removing the model an elastic mould of the object is obtained, and if properly made the mould possesses all the perfection of the original model. In this elastic mould an opening is cut at the proper place for the introduction of melted wax, resin, or paraffine, or a compound of these or other analogous material.

Before the wax is poured into the mould for the purpose of forming a wax pattern the edges of the cut are coated with a thin solution of vulcanized rubber in benzine, which in a few minutes will be very adhesive, and the cut edges may be so joined (if done with care) as not to leave a trace of a joint. Then the rubber mould is suspended in cold water for the purpose of cooling the wax and retaining the rubber mould in shape. Then the melted wax is poured slowly into the rubber mould at the opening cut for that purpose until full. If the object is of such a nature as to be hollow when cast in metal the surplus wax is poured out as soon as the wax has formed a shell by cooling on the sides first. When the wax has fully cooled in the rubber mould, which cooling takes place in a few minutes, according to the temperature the mould is removed from the water, and at the place where the joint is in the rubber mould the said mould is easily torn apart, and may be readily removed from the wax pattern without injuring the finest parts thereof.

If the elastic or rubber mould is perfect it will be found that the wax pattern so produced is a perfect facsimile of the same. Such a rubber mould can be used without injury for casting thousands of wax patterns.

It will be easily understood by those familiar with the art of making undercut work in metal that such an elastic mould for casting wax patterns if made of good rubber is almost without limitation in its applicability to intricately undercut work, whether it be a statuette or other metal work.

The second part of this Invention relates to the forming of a loam mould around a pattern of wax, resin, or paraffine cast in the elastic mould.

This object is effected in the following manner:—A fine slush of clay or loam is prepared suitable for making loam moulds for casting metals. This slush or paste of clay is applied to the wax pattern with a brush to the thickness of about $\frac{1}{16}$ of an inch, care being taken to introduce the clay slush into every recess of the pattern. Then the same is covered with a body of finely-ground brick or other burned clay. The well-known capacity of burnt clay for absorbing moisture is taken advantage of in this novel manner to quickly absorb the surplus water in the clay slush with which the wax pattern is covered. In a few minutes after covering the slushed pattern it may be taken from under the brickdust, and whatever brickdust clings to the same may readily be removed by a soft brush. It will then be found that the brickdust has absorbed most of the water and the slush has been transformed into a nearly dry mantle or coat of clay lying firmly and closely on the pattern. As this first thin layer of clay would be of insufficient strength to answer as a mould another mantle or coat of coarser loam in a plastic state and mixed with fibrous material, such as is commonly used with clay to afford greater strength, is laid on the first fine coat, and is pressed or daubed on by hand to the thickness of about one inch, more or less, according to the size of the mould and then the whole is buried in brick-dust to absorb the water and dry it as above stated.

The employment of an absorbent material as above described enables one to use the paste or slush as a first facing or coating on the pattern very soft and wet.

The absorbent material in promptly and readily drying the slush has two important and practical effects,—

First. It prevents any falling away of the material of the mould from any part of the pattern, which is liable to occur in the comparatively slow process of drying by evaporation. This difficulty renders it impossible under the ordinary process of constructing the moulds to employ the slush in so wet a state as to adapt it to enter the fine interstices of the pattern as closely and completely as it can under the process described above.

Second. The rapid drying of the material of the mould causes a shrinkage therein, which has the effect of pressing the partly dry but still plastic material still more firmly and securely upon the pattern, and into all its recesses. This effect is produced more especially in the rapid drying of the entire substance of the mould after the application of the outer coat or mantle.

Although a very fine and perfect mould is obtained when made in the manner described, it is still preferred to employ another auxiliary to produce the best results with almost unfailing certainty. By means of a very simple apparatus the operator can apply, in addition to the shrinkage of the material, a uniform moderate pressure, which is applied to the plastic mould material in such a manner as to press equally on every part of the pattern, no matter of what shape it may be. This apparatus consists of a simple screw press provided with a movable air-tight base and extended platform.

Figures 1 and 2 in the Drawing represent vertical sections of this press apparatus. The air-tight base A is provided on top with a cover B, which is fastened to the screw C, so as to close or open the base A for the purpose of introducing the mould and confining the compressed air, which is employed as the pressure medium. The base rests and runs on two V slides D, so that it may readily be removed from under the cover. As soon as the second or outer coat of the mould or mantle is applied to the pattern the operator introduces the whole into an elastic bag E of thin rubber within the box A, fills the said bag around the mould with the capillary or absorbent material or brickdust, securely binding the open end of the bag, pushes the base under the screw cover, closes the cover by means of screw C, and admits through the pipe F a current of compressed air at a pressure of about 12 or 15 pounds to the square

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inch. The air, being prevented by the rubber bag from coming in contact with the soft mould material, will exercise a very uniform pressure on the outside of the bag, and through that on the brickdust and plastic material, thereby pressing it still more to the pattern, and assisting the brickdust to absorb the water. But a few minutes are required when the air is released by raising the cover B. When the bag is removed from the base the mould may be taken out, and the adhering brickdust is easily brushed away. The mould still containing some moisture is now set aside to dry completely by evaporation, previous to which a proper opening has to be cut for the introduction of the metal. When a number of such moulds are ready, and nearly dry, they are placed into a moderately heated oven to gradually melt out the wax, resin, paraffin, or composition pattern, if the same has been used. The wax may be nearly all gathered in a dripping pan set in the oven. This done the heat is gradually raised until the mould is at a low red heat, so as to burn out all the wax, and render the mould strong and hard, and ready for casting.

When an object is to be cast hollow the wax pattern is cast hollow, as above described, and is filled in with a composition of one part of coarse ground brick, one part of plaster of Paris, and one part of sandy clay or loam. The composition is mixed like plaster, so that it may be poured into the hollow part of the pattern. It will set like plaster, and proper core or stay rods will hold it like any other core in the proper position after the wax is melted out.

Although this new method of moulding is specially adapted for and effects the greatest saving of labor in connection with irregular shaped, round, or under-cut castings, it may also be used for flat or straight castings, and in such cases metal patterns may be used, which are treated in the moulding process in the same manner, only that the mould is to be made in two halves, and the pattern is drawn out before the moulding loam becomes too dry, that is, after it is taken out of the brickdust. When a wax or resin pattern is used the mould is made throughout of one piece.

The third part of this Invention relates to the casting of the object moulded, and the apparatus to be employed therein.

Every practical metal founder is aware that if a mould is made of too fine and dense material, the metal cannot be made to lie closely to the

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mould and produce a perfect casting of the same, unless some means for introducing the metal be employed other than simply pouring it into the mould from the melting pot, as in the usual mode of casting. As a very fine facing slush is employed in this improved process to obtain a perfectly fine face in the mould, a very close and fine porous surface is produced which requires more than the pressure or weight of a short gate or riser (as now used on castings), if the metal is to lie to the dense mould and produce a sharp and well defined casting. To accomplish this object an apparatus or furnace is employed, which is so constructed as to give a pressure of about 20 pounds to the square inch on the fluid metal, and of such a construction as to form a fountain or reservoir from which the melted metal may be introduced in quantities accurately apportioned to fill any mould no matter what the quantity required, be it one ounce or the whole contents of the furnace. This apparatus consists of a melting pot arranged and resting on a stand pipe of about six feet in height. Said pot has a hole in the bottom and is connected with the stand pipe.

At the lower end of the stand pipe is a T shaped end which helps to support the pot and pipe, said T shaped end has an outlet which is provided with a valve or faucet-like closable mouth-piece, and is arranged to admit the fluid metal from the pot through the stand pipe into the mould, at a pressure of about 20 pounds to the square inch. By the arrangement or provision of a valve or faucet, the flow of the metal may be cut off or let into the mould at pleasure. The whole pot, stand pipe, and valve or faucet are all firmly connected and enclosed in a furnace of corresponding height and size, for the purpose of heating the metal to fusion and form permanent parts of the furnace.

In the Drawing three different modifications of my furnace are represented, two of which are of such construction as to produce the required heat to fuse the metal by the burning of gas and air.

Figure 5 represents an elevation of a furnace with the iron front, fire-brick lining, and table removed, so as to show the interior of the furnace which may be heated by wood, coke, or charcoal.

In all modifications represented the essential principle remains the same. The apparatus or furnace is also provided with an adjustable table on which the moulds are fastened by means of a clamp and are then ready to be filled with molten metal.

Figure 4 represents a front elevation of the same furnace with the front iron casing, fire-brick lining, and mould table removed so as to show the interior of the furnace.

Figure 6 represents a cross section of Figure 3 on line A, A; Figure 7 represents a back view of the adjustable table; Figure 8 is a cross section of Figure 4 on line B, B.

Similar figures denote corresponding parts of the apparatus.

The construction of the furnace or apparatus is as follows:—An iron casing, is composed of different sections and pieces until the required height is obtained; said iron casing is firmly screwed together by the several different flanges 2 provided for that purpose. The whole rests on a platform 3; this iron casing is for the purpose of firmly holding together the several pieces of the fire-brick lining 4. The melting pot 5 is made out of the best quality of black lead crucible material, and is provided with a hole 6 and an extension 7 of the same size as the stand pipe, so as to make a good connection with the same.

The stand pipe 8 is made in several sections and of the same material as the pot, and is provided with extending flanges 9, plainly shown in Figure 8, said flanges run down on both sides of the pipe and are somewhat notched in the front and back of the fire-brick lining, as may be seen by Figure 8, and are for the purpose of forming a partition and dividing the furnace into two parts or flues for a uniform circulation of the heat. Furthermore, said flanges give a firmness and support to the stand pipes. The several sections of the stand pipe are well and firmly jointed together by another smaller pipe 10 fitted and pushed in the outside larger pipe covering the joints of the larger pipe and making a connection with the melting pot. The stand pipe 8 ends near the bottom of the furnace in a cross piece 11, and extends partly into a hole in the back wall of the furnace; at the front end of this cross piece there is a mouth-piece 12 which forms part of the valve or faucet and extends through the fire-brick front wall fitting into a proper seat on the iron casing; the mouth-piece or faucet ends in a half globe-shaped lip 13 projecting through the front iron casing, and is for the purpose of making the connection with the mould to be filled with metal; the mouth-piece is closed at one side and has a taper-shaped opening on the other for the admission of the plug 14, which plug forms the intercepting medium to cut off or permit the flow of the metal; this plug 14

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has a stem or extension passing through the fire-brick lining to the outside of the furnace where it is provided with a lever or wrench 15 by means of which the plug may be turned to cut off or admit the metal; the mouth-piece 12 has an opening 16 at its lower side, said opening making connection with the pipe 17 extending to the outside of the furnace, said opening and pipe are for the purpose of giving an outlet to the metal which is left in duct 18, crossing the plug when it is turned to cut off the supply of the metal; the metal remaining in the duct finds an outlet through the pipe 17, so that the duct may be empty for a free passage of the fluid metal when the succeeding mould is to be filled.

By means of a set screw 19 pressing against an iron plate 20 the cross end of the stand pipe and the mouth-piece 12 are pressed against the front iron casing, making the whole firm and solid.

The heating of the furnace is effected by the burning of gas which has its inlet from a base 21 through one or two supply pipes 22 at the bottom of the furnace; the required supply of air comes from the base 24 through a pipe or pipes 25. The gases ignited pass from the bottom of the furnace in the directions of the arrows shown in Figure 4 to the top, encircle the melting pot, and pass again down to the bottom of the furnace, as indicated by the arrows; what is not consumed escapes through a flue 26.

If the heating of the furnace is to be effected by the burning of wood or other fuel giving a good flame the shape of the furnace has to be modified, as may be seen in Figure 5. On one side of the furnace is an attachment or chamber 27 for the reception and consumption of the fuel; this chamber is provided at the top with a trap door 28 for the introduction of the fuel, and at the bottom with grate bars 31. If the fuel is wood it ought to be in long sticks so as to create a high flame and stand upright in the combustion chamber. The combustion chamber is separated from the furnace containing the stand pipe and melting pot by a partition 29, the said partition being provided with a series of holes 30 through which the flame passes in the direction of the arrows around the pot and down to the bottom of the furnace, finding an escape through the flue 32 in the bottom of the furnace.

Another part of the said Invention relates to the construction of a mouth-piece, valve, or faucet, and the material for the same.

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Haseltine's Improvements in Casting Metals.

When speaking of a valve or faucet and mouth-piece fitting so nicely as to prevent the leakage of melted metal at a white heat and high pressure of 20 lbs. to the square inch, and at the same time to be of such a nature as to operate freely and be closed and opened at the will of the operator, and be of some considerable durability and strength, it must appear to a person of practical knowledge in the handling of refractory metals in fusion that a material must be employed which has the property of great hardness and strength combined with great resistance to high heat, and also capacity to resist the unequal temperature to which such valves or faucet and mouth-piece must unavoidably be exposed without breaking or shattering the same to pieces, as most of the materials for resisting great heat and which are used for metal melting pots, furnace lining, and the like, are of a rather soft, coarse, and easy crumbling composition, and are so even when burned under a very high heat, or else if hard when burned will glaze and break to pieces when exposed to unequal temperature.

To overcome these difficulties is one important object of this Invention, and the manner of making such valves, pipes, faucets, and mouth-pieces forms a part of the improvements.

The material employed to make the valve faucet and mouth-piece is a composition of the material used of the best quality of blacklead crucibles and the mixture used for the making of the world renowned "Meissen porcelain," two parts of the said blacklead crucible material are well mixed with one part of the porcelain clay. When in a plastic state the rough outline and form of the piece is given, then when nearly dry it may be finished and properly shaped by turning and cutting. This done all the parts and surfaces of the piece made (be it valve, faucet, or mouth-piece, or a pipe) which are exposed to wear or friction from another part working or moving in the other, are laid over or covered with a thin layer of said composition only composed of different proportions, namely, two parts porcelain clay, and one part blacklead mixture, but very finely ground, or even with the pure porcelain clay alone. Great care must be taken to lay this coating or in uniform thickness, and not thicker than $\frac{1}{32}$ of an inch. When all nicely finished in the shape desired the parts so made are rendered perfectly dry, and afterwards are burnt in a close muffle furnace or other closed fire-proof vessel. The heat required to burn such parts must be raised gradually to a white heat, which must be maintained for three or four

hours, and they are then slowly cooled off. When burnt as explained it will be found that the main body of the article so made is much harder and stronger than if made out of crucible material alone, and that the surfaces on which the said layer of porcelain is laid in the manner described is hard and of a flint-like nature so that it may be ground and polished to a perfect fit with any other part of the valve or faucet. When two parts are so fitted together they will move and work in each other even if exposed to a while heat, and with but little if any wear or friction. If any part so made should shew fine surface cracks of the porcelain coating after burning, all that is necessary is to fill those fine cracks again with a fine slush or paste of the same mixture, rubbing it well into the cracks, and after burning it over again as described it will be found that all the cracks are closed, leaving a uniform surface.

When the apparatus above described was first put in practical operation the valves, mouth-piece, and such parts were made of the pure porcelain clay and encased with a blacklead mixture so as to protect them against too sudden heat or cooling. But as porcelain cannot be made very thick or of greatly unequal thickness in different parts without great risk in fracturing the same it was a most difficult task to make such parts well, and being thin they were broken too easily when in use. By adapting the blacklead crucible mixture in combination with porcelain clay a material is obtained of considerable strength and hardness which can be made into a piece or article of considerable size and thickness without being liable to fracture in burning or use. Furthermore, it will stand as sudden a change of temperature as a blacklead crucible without fracturing.

The essential point of having a hard and smooth surface for grinding and fitting together the surfaces coming in wearing contact is obtained by the application of the thin layer or coat of porcelain (or composition partly of porcelain) which is laid on the surface of the body of the article before burning.

If desired all the different parts of the furnace, such as the pot, stand pipe, cross end, and the like may be made of the above described mixture of blacklead, crucible mixture, and porcelain, which would make the whole much stronger but somewhat more expensive. Furthermore, the said composition of blacklead, crucible mixture, and porcelain in the proportions stated is a most excellent material, of which all

kinds of vessels and other things may be made which are or may be of great utility in the manufacture of metals by reason of the greater strength and resistance to heat. The said mixture consists of about 4 parts pure Ceylon blacklead, 3 parts of German clay (called in German Kiesselguhr), 4 parts of pure kaolin, and 1 part of felspar. Slight variations will not change the quality to any extent.

Having made a number of moulds in the manner described, each mould is placed in a suitable flask or iron case, which has a concave semicircular hole on one end, and all the empty space in the flask left by the mould is closely packed with moist moulding sand, so as to keep the mould in proper position and prevent its bursting when the metal is let in. The flask is then provided with a cover 40 laid on the adjustable table 41, the concave semicircular hole in the flask being towards the mouth-piece of the furnace, then by means of the screw 42 and hand wheel 43 the table is raised or lowered until the concave semicircular hole in the flask is in line with the ball-shaped lip or end of the mouth-piece of the furnace, the flask being fastened to the table by the bolt 44 and clamp 45; the table, swinging on its axis 46, being swung towards the furnace by means of the lever 47, will make a close connection of the mould with the mouth-piece, through which the fluid metal will enter the mould as soon as the valve is opened by means of the lever 48. The pressure of the metal is equal to the weight produced by the height of the column of fluid metal in the stand pipe.

The above described casting apparatus is also an excellent machine for making castings out of the softer and easy melting metals and compositions by reason of the great and uniform nicety with which the pressure can be regulated by the height of the stand pipe, of the easy and economical operation of the same. The pressure of the metal once regulated by the height of the stand pipe is always the same, and for that reason plaster moulds may be employed for metals melting at a low degree of heat.

The great advantage of the apparatus when employed for casting stereotype plates could be only appreciated when seen in operation for that purpose.

If the said apparatus is used for casting metals which melt at a low heat the pot, stand pipe, and valve, or faucet may be made of iron, the shape and principle remaining the same.

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A.D. 1875.—N° 2467.

Haseltine's Improvements in Casting Metals.

Having thus fully described the said Invention as communicated to me by my foreign correspondent, and the manner of performing the same, I wish it understood that I claim,—

First. An elastic india-rubber mould for forming of wax, paraffine, resin, or other suitable material which will melt at a moderate temperature, patterns to be used in the art of making moulds for casting, or otherwise filling such moulds with metal.

Second. The process of constructing moulds for casting metals by the application to the patterns of the inner material of the mould in a soft and wet state, drying the same by an absorbent material, and subsequently applying the more dry and plastic coat or mantle, as above set forth.

Third. The manner of applying a moderate pressure on the exterior of a mould of irregular shape by enclosing the same in an air or water-tight bag, and the whole in a closed case or box, as above set forth.

Fourth. A furnace in combination with a fixed metal pot elevated at a required height on a stand pipe to obtain a high column of molten metal, thereby obtaining a uniform and well regulated pressure on the metal allowed to flow in the mould through the stand pipe and valve, as above set forth.

Fifth. The combination of a valve or faucet with the stand pipe and melting pot as a permanent fixture and part of the same, for the purpose set forth.

Sixth. The mouth-piece in connection with the T shaped end of the stand pipe, as above described and for the purpose set forth.

Seventh. The combination with a casting furnace of an adjustable table, as above described and for the purpose specified.

Eighth. The flanges on the stand pipe, as above described and for the purpose set forth.

Ninth. The use of porcelain clay in combination with the black lead crucible stuff, or its component parts, in the construction of parts of a furnace, as herein described and for the purpose set forth.

Tenth. The use of porcelain clay, or its component parts, as a facing or plating to the wearing surfaces of a valve, faucet, mouth-piece, or other part of a casting apparatus, in the manner above set forth

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Haseltine's Improvements in Casting Metals.

Eleventh. The combination of porcelain clay and black lead crucible mixture, or its components parts, for useful purposes in the art of manufacturing metal and metal compositions.

In witness whereof, I, the said George Haseltine, have hereunto set my hand and seal, the Eighth day of January, in the year of our Lord, One thousand eight hundred and seventy-six.

GEORGE HASELTINE. (L.S.)

Witness,

ROWLAND GEORGE BROWN,
8, Southampton Buildings,
London.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1876.

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391,230 COMPLETE SPECIFICATION 1 SHEET

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

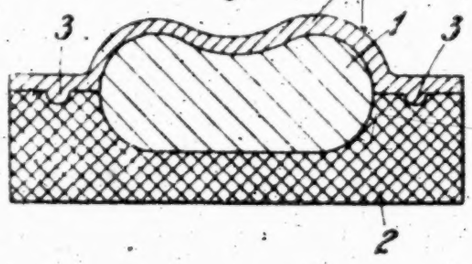


Fig. 2.

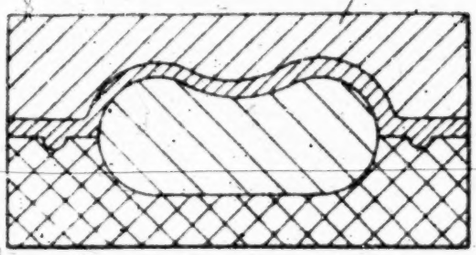


Fig. 3.

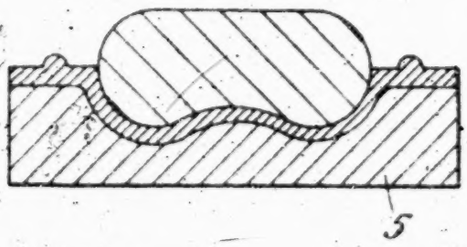


Fig. 4.

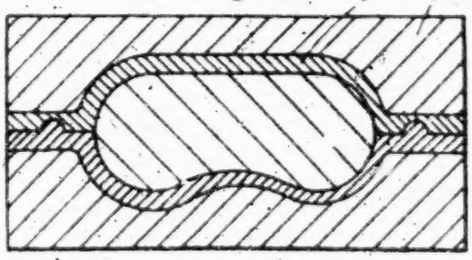
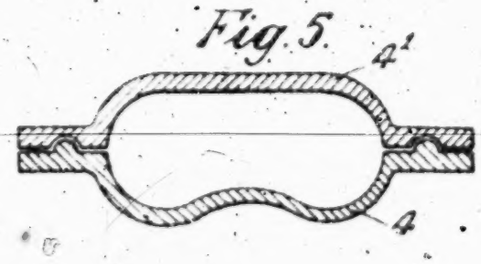


Fig. 5.



Malby & Sons Photo-Litho

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PATENT SPECIFICATION

Convention Date (Hungary): Dec. 6, 1930.

391,230

Application Date (In United Kingdom): Oct. 27, 1931. No. 29,759/31.

Complete Accepted: April 27, 1933.

COMPLETE SPECIFICATION.

Improvements in or relating to a Process for the Production of Casting Moulds of Rubber.

We, THE ANODE RUBBER COMPANY LIMITED, of 10, Lefebvre Street, St. Peter's Port, Guernsey, Channel Islands, a Company incorporated under the Laws of Guernsey, (Assignees of MAGYAR RUGGYANTAARUGYAR RESZVENYTARSASAG, Budapest, Hungary, a body corporate organised under the Laws of Hungary), do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a process for the production of casting moulds of rubber particularly for the reproduction of sculptures and the like.

Several processes have already been disclosed for the use of various forms of rubber, as for instance, rubber sponge for the production of casting moulds.

The use of casting moulds made from rubber for the reproduction of sculptures from plaster of Paris or from artificial stone has the great advantage that such moulds, owing to their elasticity, can be stripped off after casting from the models and may repeatedly be used. Besides, the elasticity of such moulds makes it possible even in the case of complicated models to use moulds consisting of two parts only.

According to these prior processes it is usual to produce these casting moulds of rubber in such manner that first a thinner and then several thicker rubber sheets are placed upon the model, which sheets have to be naturally of such size that, along the outer contours of the model, a border of suitable width remains for providing the two halves of the mould with the grooves and strips necessary for fitting them together. The rubber sheets are thereafter pressed onto the model and vulcanised under pressure.

According to the invention the method for the reproduction of models, particularly of sculptures and the like, by producing casting moulds of rubber comprises coating the model to be reproduced in one or several operations with one or more layers of an aqueous dispersion of organic materials of the kinds hereinafter specified removing the water from the rubber containing layer or layers, preferably vulcanising the remaining coherent rubber layer on the model itself and thereafter forming reproductions of said model by the use of the casting mould of rubber so produced after first removing the model from said casting mould.

One or more of the known operations for coating, such as dipping, spreading, spraying, casting, electrophoresis may be used. The first layer is preferably produced from a liquid of small viscosity in order that the rubber layer remaining from this liquid should penetrate into the smallest cavities of the model. For the production of the next layer we may use also liquids of greater viscosity such as pastes. After having reached a certain thickness, raw or pre-vulcanised rubber sheets may also be used for further increasing the thickness of the layer.

By the process according to the invention it is possible to use models of plaster of Paris or of similar material of relatively small resistance instead of metal models used in the processes up to now. While in the production of moulds from sheets relatively great pressure is required for the vulcanisation, this is not the case with rubber dispersions, as the rubber layer takes up without any external pressure the outlines of the model, so that vulcanisation can be carried out with a minimum pressure, or even without pressure. Moreover, the application of the first layer is easy and more perfect results are obtained than can be achieved by applying rubber sheet even in the most skilful way.

It has been found that rubber solutions, the so-called rubber organosols are also not suitable for making rubber moulds. Only very thin layers can be obtained at a time from such organosols, so that in order to get a mould of suitable thickness a large number of layers would have to be applied. As in such organosols the rubber is in a thoroughly masticated state finished products of less resistance are obtained even after vulcanisation. The use of aqueous dispersions offers a further

advantage against that of organosols, inasfar as thereby the use of inflammable solutions or of solutions generating gases injurious to health, is avoided.

The emulsions or dispersions used according to the invention comprise those consisting of or containing rubber, guttapercha, balata or similar resins occurring naturally or artificially obtained and in vulcanised or unvulcanised condition.

Such artificial aqueous dispersions may include those of coagulated rubber, vulcanised rubber, synthetic rubber, waste or reclaim.

If desired any of the aforementioned dispersions may be used alone or in admixture with one another.

Any of the aforesaid dispersions may contain the usual known compounding ingredients and/or may be in concentrated form.

Aqueous emulsions or dispersions can also be employed which are or can be rendered capable of gelling on the application of heat or to which substances can be added to cause the aqueous emulsions or dispersions to gel in the cold after a definite and controllable time interval.

In those cases wherein it is desired to make the casting moulds of rubber sponge latex froths prepared for instance according to British Specification Nos. 332,525 and 332,526 can be used.

One method of carrying out the process according to the invention is described in the following example and with reference to the accompanying drawing.

In the drawing, Figure 1 shows a sectional view of a model of gypsum lying in a mould of gypsum of a size so that half the model can be enclosed. A rubber layer is applied to the free half of the model. Figure 2 shows the cross-section of the same model together with a base-part produced on the rubber layer by way of casting. Figure 3 is a sectional view of the half rubber-covered model embedded into the plaster of Paris, prior to the covering with rubber of the other half of the model. Figure 4 shows also in a cross-sectional view the model covered on both sides with rubber and provided with the base-part of gypsum. Figure 5 is a cross-sectional view of the vulcanised open casting mould.

The production of the mould is first carried out in the following manner:—

The model to be reproduced 1 for instance a model of gypsum as shown in Figure 1 placed into a half-former of gypsum 2, which is provided with a border having a groove 3, for the purpose of fitting the half-parts together. The model lying in the former of gypsum is covered by spreading with an aqueous dispersion containing rubber, which may have for instance, the following composition:—

Rubber (as latex)	100	parts by weight.
Sulphur	3	" " "
Oil	6	" " "
Accelerator	1.2	" " "
Antioxidant	0.5	" " "
Soap	0.9	" " "
Casein	1	" " "

100 parts of the dispersion should preferably contain 67 parts of dry substance of the above composition. Its titrated alkalinity should advantageously correspond to 0.05% OH.

After covering, the layer is dried and by means of several steps of spreading and drying, several layers are applied, until a rubber coating of the desired thickness is attained. After the last drying a layer of gypsum of suitable thickness is poured onto the rubber layer and after the setting of this layer, the lower half-former of gypsum is removed, so that the model lies now with its rubber-covered half in the new base-part of gypsum 5. The border of the rubber mould is then brushed with a substance preventing sticking, as for instance aluminium or graphite-paste, and that part of the model which has been freed is covered hereafter with rubber in the manner as described above. After having provided this rubber covering 4', this side again is provided with gypsum of the desired thickness 5'. The rubber mould obtained in this manner is according to Figure 4, vulcanised, between the base-parts of gypsum and the model. The tensions possibly produced in the rubber during drying cease during vulcanisation, so that when the former of gypsum is taken to pieces after vulcanisation, the rubber moulds separated from the model undergo only very slight contraction.

The process above-described can obviously be carried out in many ways. For example in the case of models with simpler outlines, casting moulds of rubber consisting of one part only may be used. In this case the individual layers may preferably be produced by means of dipping. For this purpose the mixture given above may be used after it has been diluted by the addition of one third of its volume of slightly ammoniacal water. In the production of casting moulds for use in connection with bigger moulds with complicated outlines, the moulds may consist of more than two pieces. Instead of spreading for instance spraying may be used, especially in applying the first layer. The production of the mould may be effected also in such way that a box consisting of two parts is prepared from

plaster of Paris or wood, which box amply includes the model. One part of the box is filled with an aqueous rubber mixture which may if desired be frothed and which under the influence of coagulants added as for instance, sodium silicofluoride sets within a certain controllable time-interval. The model is partly dipped into this rubber mixture and kept immersed until the rubber dispersion solidifies when it is vulcanised by suitable known means. Thereafter the box is taken off and the rubber layer obtained is dried on the model. Subsequently the other part of the model is covered with rubber in a similar way.

From a casting mould produced according to any of the above manners reproductions of the model can be formed in known manner after first removing the model from said casting mould.

This invention has been found particularly applicable for the reproduction of sculpture, statuary, decorations, ornaments, architectural features and mouldings and building products.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method for the reproduction of models, particularly of sculptures and the like, by producing casting moulds of rubber, which comprises covering the model to be reproduced by any one or more operations such as dipping, spreading, spraying, casting or electrophoresis with one or more layers of an aqueous dispersion of organic materials of the kinds hereinbefore specified, removing the water from the rubber containing layer or layers and thereafter forming reproductions of said model by the use of the casting mould of rubber so produced after first removing the model from said casting mould.

2. A method as claimed in Claim 1 wherein the rubber layer is subsequently vulcanised on the model itself.

3. A method as claimed in Claim 1 or 2 wherein the casting moulds of rubber are made in one or more parts.

4. A method as claimed in any of the preceding claims wherein the casting moulds of rubber are made of rubber sponge.

5. A method as claimed in any of the preceding claims wherein the model to be reproduced is placed in a mould of gypsum so that about half the model can be enclosed, the free half of the model covered with rubber, this rubber covering provided with a coating of for example, gypsum, thereupon removing the mould of gypsum, giving the other half of the model a coating of rubber and then of gypsum and thereafter vulcanising the rubber lying between the model and the base parts of gypsum.

6. A method as claimed in any of the claims 1 to 4 wherein a box of for instance Plaster of Paris or wood of sufficient size to contain the model is partly filled with an aqueous dispersion of rubber or the like, about half of the model inserted into this dispersion, the model retained therein while the dispersion is made to solidify, the box then removed, the rubber layer obtained dried on the model and thereafter repeating this set of operations for covering the other half of the model.

7. A method as claimed in any of the preceding claims wherein the aqueous dispersions employed are capable of setting within a controllable time interval.

8. A method as claimed in any of the preceding claims wherein the model is first covered with a dilute aqueous dispersion and thereafter one or more layers of a more concentrated aqueous dispersion is employed.

9. A method as claimed in any of the preceding claims wherein after a coating of a certain thickness has been attained, rubber sheets are used for further increasing the size of the rubber mould.

10. The method for the reproduction of models, particularly of sculptures and the like substantially as described with reference to the accompanying drawings.

11. Casting moulds of rubber, particularly for the reproduction of sculptures when produced by the method claimed in any of the preceding claims.

Dated this 26th day of October, 1931.

W. BOND,
Acting for the Applicants.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1933.

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THE TREATISES OF BENVENUTO CELLINI ON GOLDSMITHING AND SCULPTURE.

the plate, at the centre point in fact, being careful always not to lose the point. The movement of the hammer should be in the form of a spiral,* and follow the concentric circles; you take turn about in beating and heating in this manner till you see the silver grow into
1343 the shape of a hat, or at least its crown,† & thus approximating to the form of your vase. The thing to observe is that the metal should spread equally all round, for if it gives more on one side than the other it would be uneven; and in this way you draw it inwards till it is as deep as the body of your model requires. Then with various different stakes, each adapted specially to the form you are at work on, you beat, now with the broad, now with the narrow end of the hammer, and right into the body of your vase till it is equally bellied all round; and when this has all been very carefully done, always working on the stakes—some of which are called 'cows' tongues'‡ because of their shape—you work up the neck
1344 of the vase to the necessary height, and similarly on other stakes specially curved for the purpose, you little by little narrow out the neck. Any little imperfections§ on the surface you remove as you go on, and so finally see the neck of the vase take the perfect shape you wish it to have.

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* Chiocciola. We had the word above as applied to the female screw.

† Coppa.

‡ Lingua di vacca.

§ Sfogliettina.

When you have thus finished the neck, you can begin to work the bas relief on the body of the vase; like a vase, for instance, that I made for King Francis,‖ it was one among many, but it was the finest of the lot. I filled it with black pitch made in the manner I described¶ to you before, then I divided out the body of the vase for the figures, animals & leaves, which I drew on it with a stylus of burnished steel. This done, I drew them over again with pen & ink, using all the delicacy that good drawing requires. Then I took my punches, these are of iron, about the length of a finger and about the thick- 1346
ness of a goose's quill. They are all shaped in different ways, some are fashioned like a C, beginning with a small c, and ending with a large one,¶ some are bent more, some less, and some are almost quite straight.** Others, again, are greater, diminishing from the size of a man's thumb to six different smaller sizes, and all these selections you ought to have. With them, and with a hammer weighing some three or four ounces, and striking most dexterously, you beat into relief whatever you have designed. Then you place your vase on a slow fire and melt out the pitch. After this you heat the vase once more and clean it with a solution of tartar and salt, in equal proportions as I described above. When the 1347
vase is quite clean you employ a set of iron tools like stakes and with long horns,†† technically termed *caccianfuori*, 'snarling irons'? they are made of pure iron, long or short as the case may be, and as the work may need. These *caccianfuori* have to be fastened into the anvil stock,* then you put one of the horns into the vase, so that the point of the horn, which should be in

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‖ See 'Vita,' p. 321.

¶ What our metal workers call semi-ring tools.

** Curved chasers.

†† Con lecorne lunghe.

* Brinckman translates, 'a vice.'

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shape and rounded like your little finger, is applied to the inside of the vase, & to the parts you want to beat out; and you very gently strike the other end of it with the hammer so that the blow passing to the end of the horn adjoining the body of the vase, bosses up the silver from within at such points as your learned and cunning master may deem well. When this process has been applied to all the figures, animals, and foliage, you heat and cleanse the vase once more, once more fill it with pitch, and with other sorts of punches, similar in all respects to the first, but having their ends shaped like
1349 beans, and large or small as the case may be, you begin the bossing again. Each master uses his own particular punches, & all have their own little ways of working, but all have this in common that the punches do not cut but only press the metal. The process of melting out & reapplying the pitch may now be repeated two or three times as may be thought necessary, till you have got your figures and foliage to the highest point of workmanship, then melt it out for the last time. After this you may proceed to fashion in wax whatever graces may have place at lip or handle, improving on the model or design with which you started. These finished, you can make
1350 them in all sorts of different ways, ways so many, that they were wearisome to recount. The easiest of these was the one I usually employed, and particularly in the vase I made for King Francis.† I took earth, such as the makers of artillery use, dried it and sifted it well, then I mixed it with fine cloth shearings and a little cows' dung sifted through a sieve, then I beat it all well together. After this I took some tripoli, such as jewellers use to polish their gems with, pounded it up very fine & made from it a pigment as for painting, streaking it over the wax ornaments. This I also did to the inlet

† This is the ordinary 'cire perdue' process.

holes and vent channels after I had duly affixed them to the models. I always took care to fix these vent holes down below, and pass them upwards, but at such distance from the inlet channel that none of the silver should spill into them, and thus prevent them doing their work. When I had applied the first coat of tripoli I let it dry. Then I took the clay of which I told you before & coated the work over to the thickness of a knife's back, letting it dry again, and repeating this process, till the different coats were about a finger thick. Then I bound it all round with iron bands as many as it could hold, over 1352
these iron bands I put more coats of clay; this time mixed up with rather more cloth shearings than I had used previously, & applied another coat again of a knife's back thickness. Then I applied the whole to a slow fire, holding the vent holes downwards, and so gradually melted out the wax, which I caught in a little receptacle down beneath. One has to be very careful not to have the fire too hot, for that would make the wax bubble, and so damage the mould within. When the wax is quite melted out, you remove the mould from where it is attached to the vase, clean it carefully of all wax, and close up the place where it is attached to the vase with the same earth that is used above. This done, you 1353
bind the whole thing round again with fine bands of iron wire, & cover it up completely with a further coating of the tripoli mixture. Then you heat it on charcoal, firing it and the charcoal together in a brick furnace; and mind to get it well baked, for this kind of earth differs from others, in that it should all be fired at one turn. Meantime, have your silver ready for casting, or I would say molten, and while this is in progress put your mould into a large receptacle filled with sand, which should be moist, not wet; & fix it in well as do the casters of artillery into their troughs, but with the greater delicacy that the

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handling of lighter metal requires.* When your silver is well molten, throw finely powdered tartar over it to keep it fresh. Then take a piece of linen, the size of the crucible, folded into four and soaked with olive oil, and spread it over the tartar that covers the silver; and grip the crucible with the tongs called *imbracciatoie*. You ought to have many kinds of these, small, medium, great, and adaptable to the quantity of silver you have to melt; they hold the crucible together and prevent it breaking—that happened to me many a time. Just as
1355 you've got your silver nicely molten and are pouring it into the mould, crack goes your crucible, and all your work and time and pains are lost! Take note therefore of this, while pouring your silver into the mould, let one of your assistants hold the linen rag from slipping from the crucible, for by so holding the rag on, it has two good results; it keeps the silver warm and it prevents the little bits of coal from falling into the mould. This also you may take note of: If you have little masks and suchlike conceits to apply to your vase, when you have fashioned them all carefully in wax and taken them off the vase having made moulds of them as above described, you lay in the hollow of the moulds a coating
1356 of wax, a thin knife's back more or less in thickness, or of such thickness as you wish your mask to be. This coating you spread equally all over. In the craft it is called the *lasagna*. When you have fixed on to it the inlet channel & the vent holes—just as I told you above, the latter fixed at the bottom & turning to the top—you fill in the whole with the clay, bind around with wire, and cast in the same way as before.† This method you can employ in the handles & the feet of your vase, where you find the hammer difficult to work with, and I counsel you in working large vases always to employ this method of casting.

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* i. e., smaller work.

† This is probably what we should call a cored casting.

CHAPTER XXIII. ANOTHER METHOD FOR GOLD AND SILVER IN SUCH THINGS.

Let us take another method of casting similar to the last; I have tried it often and found it splendid; 'tis this: You take some fresh, finely powdered and ground gesso, and you grind in like manner, & mix with it, a little brick dust, two-thirds of the latter to one-third of the former. Mix them well together with clean cold water into a paste; then take a hog sable, & working with its softest part, paint over your wax model as you 1358
did before with the clay. This time you put it all on at one go, because as you gradually paint along with your brush, the gesso as gradually sets,* so that you can soon lay it on to a finger's thickness with a wooden spoon. Then you bind the mould with fine well-tempered iron wire, weaving it all round, in and across, and, taking the thick rest of your gesso that has not been passed through the sieve, you moisten it with a little water & cake it on to the mould as before, to the thickness of a knife's back, till all the iron wire is well covered over. Of course, the larger your mould is the larger must this shell of gesso also be proportionately. You will do well, too, unless pressed for time in finishing your work, to let the 1359
gesso dry a bit in the sun or in a warm and smoky corner, so that all the moisture leaves it. Then you put it over a slow fire and melt out the wax as you did in the former process: let the fire grow greater when the wax has all melted out, & bake the mould just as you did before with the earthen mould. This is a good and an expeditious way to work in, and very useful if you want to finish anything quickly.

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* Rappigliare.

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CHAPTER III. ANOTHER METHOD OF CASTING FIGURES IN BRONZE OF LIFE SIZE OR A LITTLE UNDER.

Model the figure you wish to cast direct in the clay and rag composition above described. Finish your model most carefully as regards its proportions and its details of design, in fact just as you wish to see it completed. When you have finished your figure, working it part in the fresh & part in the dry clay, as the art may require,
1361 and wishing to cast it in bronze, you give it a covering of painter's foil* in order to do which you first take a certain quantity of turps, heat it in a cauldron or pail, and when it is heated to boiling, streak it very carefully all over the figure with a hog's sable, taking heed not to injure a single muscle, vein or other subtlety, and so very carefully apply your foil. This foil has to be beaten into very fine sheets such as the painters use in many places, as for instance on their canvasses for painting coats of arms; it is well enough known all the world over. Well, you put this foil over the clay figure, and as you have to make a mould of gesso over that, you oil the whole figure well first. Were it not for the foil it
1362 would be but ill protected against the humidity and cohesive† power of the gesso, but with the foil it is well protected. In this way you work to great advantage, for after the figure is cast in bronze you still have your fine original model before you; and many youths & able workmen can help you clean the bronze figure up, while if you have no model to work to, this cleaning up takes a long time, is little to the poor master's liking, and has but a sorry result. This was what happened to me when I made the Perseus for the most illustrious Duke

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* Stagnuolo, i. e., tinfoil.
† Forza.

Cosimo, and which may still be seen on his Excellency's piazza. This, which was a figure of more than five cubits high, was made in the first of the two described methods: that is to say, it was modelled in the clay composition; & finished one finger's thickness under actual size;‡ then it was well baked, and the coat of wax modelled over it as in the case of the nymph of Fontainebleau. After this it was cast all in one piece. In order to remove the core§ so that the figure might be lighter, I made through the wax a number of holes in the flanks, shoulders, and legs, and at such places where I required them; the result of this was that the core was kept in its place. 1364 Moreover, I put over the wax those unguents which I referred to in the case of the nymph of Fontainebleau; then the two or three coats of clay, next I bound it round with the iron of which I shall tell directly, & then I cast it. This casting was, owing to its size, the most difficult casting ever made. But because I am now minded to tell of the casting of a smaller figure, I will not muddle things too much by leaving my theme. Later on I shall not fail to enter upon a little dissertation about my Perseus.

Now I have to repeat, then, that the clay figure must have a kind of paste spread over it with a very soft 1365 paint brush, & little by little the foil is laid upon it. This paste is made of flour dust, and prepared in the way shoemakers do it, or the mercers, when they make barettas & satchels and such like, and you must mind to make it very fine and thin, and when you have put the foil in little pieces all over it and the whole figure is covered, you can make your gesso mould.

There are divers ways of making the gesso moulds. The best, however, that I have come across and that I

‡ E finito magro in circa un difo.

§ L'anima, or internal block.

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mostly use myself, is to make as many small pieces as when put together would make a complete man, and that without any undercutting—as for instance feet, hands, head. These small pieces must be made with great care; and while the gesso is moist you fit into each of them an iron wire bent double, and projecting out of the gesso much like a little ring, so as to be capable of holding a thread through it. Each time that one of these small pieces is finished it must be tested, and you must see if you get a good impression from it & if the piece relieves.
1367 Then if you see that the impression relieves without spoiling a single trifle of your work's delicacy, you put the piece in its place again, and with all a good master's ingenuity take the next piece off it, leaving no rift whatever in between them such as would scar the work; & so you go on little by little, making the whole series of pieces, observing the undercutting and whatever is demanded for the head, hands, feet, &c. In this manner you carefully make your division right down one half of the figure, I mean the half, taken lengthwise, coming over the belly and the breasts down to the hips, and from the bottom of them to the half of the heels.* Mind, however, that with these small pieces the figure is not entirely
1368 covered, but leave a part of the breasts, a part of the body, a large part of the thighs, and as much of the legs. You must take care, too, that the pieces be so placed that they may be fitted together as one, but there must be no undercutting because over this half figure will have to be cast a coat† of fine gesso more than two fingers thick. Before doing this, however, you must mind to cover up with a little clay the iron rings which I told you before were to be put on the small pieces, so that in putting on the coat they do not hinder it from being

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* E da basso in sino alla metà dei talloni.

† Camicia.

lifted off. After this you carefully paint over with a brush of olive oil all such parts as shall come in contact with this coat in order that when the gesso is set the coat may easily relieve. When you have tried a piece to see if it will relieve, put it back in its place, and finish the other or back half of the figure in the same way as I bade you do the front. You must be very careful when you have finished your mould to take some strong thick cord and bind the whole figure together from top to bottom, putting a lot of little wedges of wood in order to tighten the rope yet more and prevent the gesso from 1370
twisting* and buckling. In order not to run any risk of such twisting you keep it thus bound up till all the moisture has gone from the gesso. When you see it quite dry you unwind the cord and open the mould, and that is your first mould.† This in small figures may be of two pieces only; when I say small figures I mean life size or less; these may be made in two pieces; if they be larger than that you must make them in four pieces, *i. e.*, one piece on each side from the top to the navel, & another on each side from the navel to the bottom of the figure. In order to fit better together these pieces must overlap the one upon the other a distance of about two fingers. This all minutely accomplished, you pro- 1371
ceed to open the mould and lay it back downwards on the ground, that is to say with the concave sides of it facing upwards, and you take off one by one all the little pieces sticking to the figure and put them into the cavities made by them in the mould;‡ at the same time removing the little bits of clay which you put on the iron rings; and in every place where the clay has left

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* Torce.

† Che viene a essere quella prima camicia.

‡ Or 'mother mould' as the sculptors would call it.

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impressions, bore a hole with a small gimlet§ into the mother mould, and attach to each iron ring a piece of strong cord. This cord you pass through the holes in the mother mould, and tie each piece up in this manner with a little splint of wood. When you have thus fitted all your little undercut pieces into the mother mould,‖ you grease the whole mould with soft lard, & proceed to give it what is technically termed the *lasagna*, which is a cake about a good knife's back thick of wax or clay or paste.

1373 This is made thus: You take a piece of wood and with the chisels cut out in it a square cavity the shape of a man's palm and of the depth of a good knife's back, more or less, in accordance with the thickness your figure is to have. Then you keep squeezing your cake (or *lasagna*) into this wooden shape, & apply it to the gesso mould of your figure so as to let one piece touch the other. Then you lay the two halves together on the ground side by side, and construct an iron framework which serves as a skeleton for the figure, and this must be made tortuously and in accordance with the direction of the legs, arms, torso, & head of the figure. This done, you take clay beaten together with shavings of cloth—
1374 the thin clay of which I told you before*—and little by little fit it round the skeleton, letting it dry, now by patient waiting, now by holding it before the fire, till the whole of your mould is filled. Then you test the two parts by repeatedly applying the one to the other. When this framework of earth and iron, which is called the kernel, *nocciolo*, fills the figure so completely as to tally all round with the *lasagna*, you take it out, bind it round

§ Succhiellino di tutti quei pezzi che ti tenevano i sotto squadri.

‖ Da poi che tu arai vestito tutta la tua camicia.

* Page 113.

with thin iron wire from head to foot and give it a good firing. Then you streak it over with a thin solution made of powdered bone and thin brick dust mixed with a little of the clay and cloth frayings, and apply it again to a rather slighter fire, this time so that the solution shall also be fired, then you take the *lasagna* out of your mould. You must be very carefui, too, to leave some pieces of the iron skeleton sticking out in at least four places, for they will keep the kernel from shifting, and these projections must tally with the gesso mould. When the *lasagna* is removed you once more grease the gesso mould with fat, a little soft bacon fat is best, and it is also well to have it warm, for then it combines better with the gesso. 1376

Then you make the inlet holes in which you want to pour your wax, and fit the kernel into the mould; then stand the figure up straight & make at least four vent holes, two at the feet and two at the hands, the more you make the surer you will be to fill your figure with wax.

The vent holes you make thus. The first two you place right at the very bottom of the feet, and it will be better for you to set your figure on a little eminence in order to do this more easily. You must take a stout gimlet,† and carefully bore a hole with it, and this is best done if slanting downwards, and see that you leave no fragments in the mould as you do it. When you have made these holes, you take a number of canes, which you skilfully bend, & so fit together that they start from the holes below and turn up straight alongside the figure, binding one cane to another & all together into one up towards to the top of the figure. You must be careful, too, wherever the bits of cane join, and wherever they fit into the holes, to smear them well round with a 1377

† Succhielletto.

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little moist clay so as to prevent the wax from oozing out.

After this you can heat your wax, &, when it is well molten, pour it in. This process now can be easily effected, however difficult the pose of the figure may be, if you observe the various little hints I have given you, & above all give heed to the vent holes at the base. After you have filled it with wax let it thoroughly cool for a whole day—if it be summer, say two days. Then undo the bindings with great care; & loosen all the little bits of string that tie the pieces together within, and are
1379 made for the undercuttings as I so carefully explained to you before. When you have uncovered the one half, you may complacently begin to try it from either front or back; & I tell you this, the fact of your having let the wax stand for that day or two according to the season of the year, will cause a slight shrinkage in the wax of about the space of a horse's hair, and so you will find it quite easy to remove this first piece from your figure. Then lay it down, and proceed to do the like to the next piece, & you will do well to lay both on long narrow benches, so that you can get underneath them with your hands.

After this you remove from the figure all the pieces of
1380 the mould attached with the bits of string through the iron rings one by one ever so carefully, and you polish & remove very nicely all the rough edges that may have been left on the figure by reason of the joinings of all the different pieces, and in this manner you touch up the whole. In doing this, moreover, if you are minded to add any subtle labour or fancy to your work, you are easily able to do it. After this* you fashion in wax, just as you first made them for the earthen mould† all the vent holes for the bronze casting, & mind that they

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* E di poi che tu ti sei resoluto.

† Tonaca

all slant downwards to the bottom; later when the figure has its last & earthen mould on, these vents may easily be turned up with clay. The method of doing this I shall describe minutely later as soon as I have shown how all the different coatings‡ from first to last are applied, the mould bound up and the wax emptied out.

Here all I want to insist on is that the events must be made to bend towards the bottom, because, when that is the case, the wax is more easily melted out; if they were otherwise you would hav to turn the mould up and down, which would give trouble, & you would run risk of spoiling it. But if you do it as I tell, you are absolutely safe. 1382
Then note this too, it is of the utmost importance that in melting out the wax your fire be so tempered that the wax does not boil in the mould, but comes out with the greatest patience. When the wax is all out give the mould yet another but very moderate firing, in order to get rid of any moisture that may be left in the mould. Then you may give it a regular good firing, first casing the mould in a coat of bricks set one above the other, & at about a three fingers' distance from the mould; this firing should be of soft wood, such as elder, lime, beech or twigs. Any green wood, or the wood of the oak, is to be avoided, and use no charcoal whatever, because all 1383
these fuse the clay and make it become like glass. There are some earths that do not thus cohere, and such are used in glass & bronze furnaces. I shall not fail in the proper place to tell you of these, but at present let me continue my narration of how to prepare our mould for the casting of the bronze.

Dig a pit near your furnace in front of the plug at the outlet hole,* which pit should be so big as not only to contain your figure, but also be half a cubit deeper,

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‡ Loti.

* Dinanzi alla spina.

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and in order that you can give the proper fall, the mouth or inlet hole† must be at least a quarter of a cubit above the head of your figure. So also as in the case of its depth, the pit should be half a cubit larger in width than would be needed to hold the mould. Then take the mould out of the bricks in which you baked it, and when it is cool bind it very carefully with a rope which should be strong enough to carry it, then fasten a pulley to a beam in the roof, — the rope through the pulley, and see that you provide a windlass sufficiently strong to lift your
1385 figure. As I don't want to omit certain little details, which may be well learnt from experience, I may mention that when I made my Perseus, for that the work was so very large, I lowered it into the pit with two windlasses, which were weighted with more than 2,000 lbs., but a small figure of three cubits would not need more than one. 'Tis true you might do without any windlass at all for the latter, but that would be very risky, because it might tend to move the kernel of the mould, that is the core‡ or inner block, or again it might knock the shell§ outside it. The windlass obviates this danger. And so you very very gently hoist the figure up, & move it to the mouth of the pit, & with equal care you unwind
1386 the windlass and lower it to the bottom.

When the figure is standing in position, with the inlet hole† in a line with the plugs‖ at the outlet hole, the first thing you have to do is to fit on to the vent-holes certain tubes of baked clay such as are used for water-pipes. Of these there are plenty to be got in Florence, so that I was provided, and I used some of them bent, & those for the bottom pieces, and in all such

† Boeca.
‡ Anima.
§ Spoglia.
‖ Spine.

instances when the vents were turned downwards; and fitting one tube on to another, I brought them into one straight line upwards.

This done, you take the earth you dug out of the trench and sift it well; then mix it with sand, which, however, ought not to be too soft, with this mixture you fill up the pit. The mixture of sand & earth it may be observed need only surround the figure to the extent of a quarter of a cubit, for the rest, the plain unsifted earth as you dug it out of the trench, will suffice to fill up the remainder of the cavity. When the earth has been piled in to 1388
the extent of about one third of a cubit, you go into the pit with two rammers,* which are a kind of wooden instrument three cubits long & about a quarter of a cubit broad at the bottom. And with these you pound the earth and weld it well together. In doing this you must take great care in no way to knock at the mould, it will be quite sufficient if you come within four fingers of it, and instead of the rammers, press it with your feet, still take great care not to shake the mould. This ramming in you will repeat every time you have shovelled another third of a cubit of earth into the pit. Every time, too, that the earth fills up to the level of the top of the vents, take another of the terra cotta pipes and add it on, bind- 1389
ing the juncture round well with a little clean tow in order to prevent the earth getting into the vents, for that would stop the passage of air and so hinder your figure from coming. In this way, taking heed of the vents as you fill in the earth, you pass from base to legs, from legs to flanks, from flanks to arms, till at last you get earth and vents on a level with the top of your pit. Then you proceed to make the passage† down which the bronze is to flow. Also you must take care

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* Mazzapicchi.

† Via.

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that as soon as you begin putting your figure into the trench, you begin at the same time to fill your furnace with the bronze and heat it, so that your mould shall not get damp from too long standing. All these things if they be not observed ofttimes prevent the mould from filling.

When the pit is filled up to the mouth of the main entrance‡ where the bronze is to be poured in, and also having allowed for the necessary fall from the mouth of the plug§ whence the bronze is to issue from the
1391 furnace, & having carried up all the vents as described, you keep both them and the mouth of the main entrance carefully plugged with a little tow. Then you take a lot of square tiles and make a pavement of them round the vents. As there will be more than one entrance channel for your bronze, you must take note that the flooring in question comes right up to the ingress holes of the bronze. Then you take bits of hard dry bricks broken up into pieces of three fingers or more in thickness, according to your cunning master's discretion and according to the fall your bronze may need, & then these bricks you plaster together with liquid clay and cloth shavings in lieu of mortar, on the top of your flooring.
1392 Note further, that of these same bricks you construct a channel from the wall of your furnace and running right round the ingress holes of your figure. Then you take bricks, baked or unbaked (the latter are better, though there's not much difference)* and wall up the channel to the requisite height, the thickness of a brick wall will suffice. You construct it by laying brick upon brick & making the height of the wall equal the width

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‡ Bocca principale.

§ Bocca della spina, i. e., the egress channel.

* Con tutto ci sia poco differenzia.

of the channel.† When you have carefully joined together with your moist clay instead of mortar all the cracks through which the bronze might ooze out, you remove the tow plugs in the ingress holes of the bronze, and in their stead fit some easily removable stops of moist clay made so that you can take them out without difficulty, for you have almost immediately to bring glowing coals into your channel, and with these you cover all the parts that have been walled up with clay till they are well dried, and the fire must be renewed several times till they are not only well-dried but baked. 1394

When all this is accomplished, and your metal meanwhile has got well fused, carefully blow with the bellows all the ash and cinders out of the channel, till none remains to hinder the passage of the metal; then take out all the plugs that close the vent holes, and the earthen stoppers in the ingress holes, & throw some two or three tallow candles, under one pound in weight, into the channel. Hereupon run to the mouth of your furnace and refresh it with a certain quantity of pewter of rather more than the ordinary alloy, *i. e.* half a pound per cent (*i. e.*, of bronze)‡ more than what you have hitherto used. When this has been very rapidly done, heap up more and more fire of green wood in your furnace, and 1395

† Accomodandoli intorno al tuo canale tanto quanto viene alto.

‡ E rinfrescala con una certa quantita di stagno di piu della lega ordinaria, la quale vuole essere circa una mezza libbra per cento di piu della lega che vi arai messa. Professor Roberts-Austin is of opinion that this implies an additional half-pound of pewter for every 100 lbs. of bronze you have in the furnace. If it is not so, should the word 'pewter' be translated 'tin'? that is the lead-tin alloy should contain half-pound more tin (than is usual) in every 100 lbs.

then with your iron crook (*mandriano*) for thus the instrument is called, boldly strike away the plug of the furnace, & let the bronze run; gently at first, holding a point of the iron crook in the mouth of the plug, till a certain quantity of the metal has run forth, & its first fury be spent, for if you did not do this you might run the risk of your mould being stopped up with wind. Then you can remove the iron crook from the mouth of the plug and let all the bronze go till the furnace be emptied. To this end it is necessary to have a man
1397 standing at each of the furnace mouths, who, with the scraping iron§ which is used in the craft, drives the bronze towards the outlet, until all is cleared out. Such of the flowing metal as is still left after your mould is filled you dam by means of throwing on to it with a shovel some of the earth you erstwhile dug out of the trench. That is how you complete your mould.

Not to be omitted are divers and terrible mishaps that occur from time to time, and often bring to nought all the poor master's pains. So 'tis a wise thing to profit in good time by the experience of others. Ofttimes we figure casters call in the help of ordnance founders* to aid us, but the most terrible misfortunes not infrequent-
1398 ly occur owing to their insufficient experience and want of care, and all our labour is lost. Just such a thing very nearly happened to me when I was casting my Perseus, for, calling to aid some of those fellows, I found them so absolutely devoid of sense that in their stupidity they all swore my mould was spoilt, and that there was no means of righting it, and all this thanks to the muddle they themselves had made with my metal.† The

§ I rastiatoi. Brinckman has 'kratzeisen.'

* Maestri d' artiglierie. See above.

† See the account of this in the 'Vita,' p. 420 and onwards.

statue was more than five cubits high & its pose was a difficult one, for in its left hand it held raised aloft the head of Medusa, in the hair of which was much rich detail of serpents; while the right hand was held behind in a vigorous action, & the left leg was bent. All this variety of limbs made the casting most difficult, and for this reason I was ever so keen to get it good, and also because it would be the first big work I had produced in Italy, my fatherland, & the veritable school of all the arts. So I was moved to even greater pains and diligence than I had before used to complete my figure well. So, 1400
therefore, I set to making a great number of air vents, and ever so many flowing-in mouths that all diverged from one main one, the which ran down at the back of the figure from the height of the head down to both heels and spreading out a bit at the calves. All these little hints are part of the craft, and in this manner did I practice it when I wrought in France. As I had to do almost everything with my own hand, owing to the intense bodily fatigue to which I was subjected a violent fever seized upon me. I struggled against it for many hours, but in the end it floored me, and I was brought to bed. As I had those different masters of ordnance and statuary founders working for me, I explained to them 1401
before I laid me down, exactly the methods I had begun, and how these were now perfectly easy to understand, as more than half the figure was already covered, & the greater part of the difficulties surmounted. All that they had to do was to follow my instructions in detail, and that appeared easy enough, so, being utterly incapable of holding out any longer, I flung myself on my couch.

Meantime the men worked at my furnace which I had so well prepared and in which the bronze was nearly molten* and ready for completing. Now they had a

* Condotto il mio bronzo in bagno.

good six hours' work still to employ them in order to fulfill all my instructions in proper sequence, because they were not quite skilled in the technique of the craft, and because my methods were different from those they usually employed. Well, instead of doing what they were told they began larking about, neglected the furnace so that the metal commenced to curdle, or, as it is called in the craft, to cake, *migliaccio* they call it in their lingo. Nary a one knew a remedy for this blunder, for in a round furnace like this one the action of the fire upon
1403 the metal is from above, were it from below it would be easy enough to heat the curdled metal again; so not one of them knew a remedy. Then as I lay there prostrate on my bed with fever, one of them in whom I had a little more confidence than the rest, came to me, and speaking very gently, said: 'Benvenuto, resign yourself to the worst, the furnace has been ill prepared,† a cake has formed on the metal.'

Then I turned myself toward him, and had all the other craftsmen summoned in whom I put any confidence, and asked them if they knew any remedy. Whereupon these precious fine fellows said there was no other remedy but to break up the furnace, & in so doing, as the
1404 mould was buried six cubits in the ground, they could not see (they said) how the mould could help being spoiled. For even if I tried to dig up the ground round it, which had been plugged fast, there were so many ingress holes & vents that it was dead certain to be spoiled. That, forsooth, was the only remedy they had!

Now, gentle reader, picture to yourself my state,—I in all my ills & sickness—this new trouble thrust upon me—all my honour at stake—why I felt the keenest grief that ever man could imagine! But this was no time to give way to grief. Suddenly, as in a frenzy, my

† Stata a disagio ei s'e fatto un migliaccio.

old inborn daring came upon me; it's not a thing one can learn, this! it's in a man's nature! Furiously I leapt from my bed & literally frightened away that grievous fever with the biting words I shouted at those fellows.

'Oh you good-for-nothings! who not only know nought, but have brought to nought all my splendid labours, at least keep your heads on your shoulders now and obey me; for from my knowledge of the craft I can bring to life what you have given up for dead, if only the sickness that is upon me shall not crush out my body's vigour.' Thus hounding them on I ran with them into the work- 1406
shop, and in one go ordered six of them to different

Translation of "La Gravure, etc."

Engraving, Carving, Moulding.
By Leon Verleye
Paris (1924)
Girardot et Cie
Pages 51-66

(Received in United States on or before Sept. 11, 1926)

1407

Moulding

The model selected for reproduction now undergoes the various operations of moulding in order to be cast and retouched.

Moulding is a delicate operation; a perfectly moulded model will eliminate part of the work of retouching and its character will be well preserved.

But moulding is not always done for casting; it is sometimes required to preserve an object temporarily possessed and which can be spoiled. Sometimes the

carver moulds one of his waxes because he prefers to retain his model and to give to the founder only a less fragile plaster model.

We shall thus review here the whole subject of moulding, including that intended for galvanoplastics.

Plaster Moulding

Materials suitable for moulding are numerous: wax, plaster, clay, gelatin, sulfur and iron sulfide, lacs, etc.

We shall begin with moulding in plaster.

1409

* * * * *

The moulding of pieces which are not stripped, or of a full relief piece, is more difficult; it is even, in certain cases, impracticable in plaster, and we use flexible materials such as gelatin.

To mould in plaster a full relief model, study the direction of the principal hollows in order to make a piece of mould on each, limited by the surrounding projections. When we have determined the number of pieces to be obtained, fasten the model in such a way as to permit the easy pouring of the largest piece; limit the contours of this piece with a band of wax, perfectly fixed so that 1410 the weight of the plaster will not displace it. Grease, apply the first thin layer of plaster and build up the thickness of the mould suitably with a spatula. When this first piece is dry, detach it from the model, clean the latter and, after having suitably cleaned the edges from its plaster, devise, if there is room, several notches which will be reference marks and proceed to the pouring of the second piece, and so on until the work is complete. The mould thus treated is prepared, as was said above, with litharged oil and after having fastened the pieces together it is only necessary to make proofs.

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Moulding in Various Materials.

Smooth objects can be moulded with wax, stearin, lacquer, sulfur, iron sulfide. It is evident that each of these has its advantages and disadvantages. Wax and stearin, as well as guttapercha or rubber, are valuable for galvanoplastic reproduction. It is necessary to use warm wax, almost at its coagulation point, on fragile models; gutta is suitable only for hard pieces. Rubber dissolves in benzine or carbon tetrachloride applied with a brush, a slow process. Lacquer gives perfect imprints, 1412
but it can be applied only to models that have been rigorously smoothed and casting in moulds produced with it must be done with plaster or stamped wax. Sulfur is fragile. Iron sulfide gives advirable impressions.

* * * * * *

Gelatin Moulding

But for carving, the ideal moulding is gelatin moulding. The quantities of this material utilized are not so great as to cause hesitation because of cost. Given the ease of operation, the fidelity of reproduction, the elasticity of the substance, it is suitable for all mouldings and castings; finally it permits the easy reduction and increase 1413
in size of models.

Let us proceed as for plaster moulding, first example, a smooth piece. Place it on a wax tray, surround it with a metal band with perfectly luted joints; it is comprehensible that without this care, the gelatin will escape thru the openings. Pour into the box thus obtained a certain amount of fuel alcohol, intended to penetrate into all openings, pour this alcohol back into the bottle and invert the mould so that the alcohol vapors do not evaporate too rapidly.

During this time, heat on a water-bath the desired quantity of a solution of gelatin previously prepared and

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whose method of preparation we shall indicate later; the quantity of gelatin naturally varies according to the size of the mould and it is easy to calculate it.

When the gelatin is perfectly fluid, add a very dilute solution of formaldehyde to it by stirring the mixture rapidly with a spatula.

Set the tray with the model upright and pour the gelatinous solution onto the latter. No more. There is no need to tap or treat with a brush, the alcoholic vapors traversing the gelatin mass and carrying the bubbles with them.

1415 It is only necessary to hasten, because the aldehyde acts on the gelatin, and coagulates it. If the operation is done slowly, we have only an elastic mass, but also a perfectly insoluble one.

The gelatin is prepared in this manner:

Place on a water-bath a vessel containing 500 grams of water and 100 grams of glycerin, when this mixture becomes warm add, little by little, 500 grams of white gelatin and mix uniformly to perfect solution. Mix with a glass or wooden rod without lifting the mass, which would accumulate bubbles.

Then allow it to cook for an hour, the water-bath being
1416 near boiling, but not reaching it. A kind of skin forms on the gelatin, containing all the bubbles, the skin being broken to decant the fluid part which drains as if from a sac and is then moulded into cakes ready for use.

Except at high temperatures, this material keeps for a long time without alteration, and it is not necessary to prepare too large quantities of it in advance.

The mould thus obtained is perfectly elastic; plaster, wax, or gelatin may be poured into it hot without fear of destroying it, which no process of insolubilization permits, except bichromate, alum or varnish.

When it is required to obtain a mould from a piece which is not smooth, place the model, suitably immersed

in wax, in such a way that the mould forms two shells whose planes pass thru the most conspicuous edge, thru the external edges and closing half of the openings in an open piece; place along the rim or external edges several grains of lead which, withdrawn from the mould, will form the corresponding number of cavities serving as vent holes when the wax or gelatin of the reproductions are cast. On the piece thus prepared and enclosed in its metal band, after having poured out the alcohol, pour the gelatin mixture and allow it to cool. At the end of two hours, it is time to proceed with the pouring of the other face. 1418

Note!

Delicately take the waxed equipment, tray, model and gelatin in its metal band; with the help of a cutting edge remove the wax projecting beyond the metal band and, working with small cuts, little by little remove all of the wax on which the model rests, taking great care not to remove the latter from the bed in which it sets. The wax is very easily removed.

If the gelatin has flowed on the face of the model, then it is easy to detach it with a hard brush and forceps in order that the second face and the edges be free from mould marks. Replace the lead pieces in their proper places and after having bathed the model in alcohol, pour the gelatin solution onto the first piece. The formaldehyde prevents any adhesion. At the end of two hours withdraw the metal circle and detach the two shells from the mould, which separate from each other without effort. With the help of a small, very thin tube, pierce, as with a punch, a hole in a selected spot to pour the reproduction wax or gelatin, and set aside for several hours (five or six) before proceeding with the pouring of the reproduction. 1419

Whether the mould has one face or two, it is now ready to reproduce the desired imprint. If this impres-

1420 *Plaintiffs' Exhibit P-19*

sion is to be made in wax, go over the surface of the mould with a brush barely moistened with spirit of turpentine, which produces the same results as alcohol, draws out bubbles and evaporates. If the impression is to be made with gelatin, moisten with alcohol. Plaster can be flowed into a mould made in this way, but the principal advantage is the obtaining of waxes in every way similar to the model and which, cast in cire perdue* give perfect reproductions almost without retouching.

* * * * * *

1421 We can thus mould quantities of objects of illustration or reproduction, enlarge them and reduce them; only the adhesive properties of gelatin must be watched and fabrics, embroideries or laces to be copied must be oiled.

If it is desired to mould a full relief wax it is necessary to suspend the small tray formed by the metal band by the middle and pour the gelatin in such a way that its level gradually reaches the line chosen to separate the two shells of the mould; allow it to set and pour the second part. The gelatin, from the time it is intimately mixed with the aldehyde solution, is cold enough so as not to damage the wax itself cooled by the evaporation of

1422 the alcohol.

The preceding principles of moulding are largely sufficient for chasing and engraving trinkets. We can, because of them, obtain the elements necessary for illustration, useful reproductions of types for casting and moulds for galvanoplasties.

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*cire perdue, literally "lost wax," is known by this name. See Encyclopedia Brittanica, 14 Ed., Vol. 20, p. 229.

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Moulding With Sand For Cast Metal

Moulding finally is the work preliminary to pouring of metal and if the carver is not called upon to practise it, it is indispensible that he know the processes in use in order to establish his models in such a way as to render this part of the work easy, which assures him great economy in retouching.

* * * * *

In "lost wax" casting, the model, exactly inclosed in sand and with a master-jet easily disengaged, is then 1424
destroyed by heat; the wax melts, flows and leaves a cavity into which the metal flows directly, but for small pieces of jewelry, it is rarely that the sharpness of the wax is retained, the pressure of the sand diminishing the clarity and the model is at the mercy of awkwardness or an accident. It is then preferable to cast the piece in gelatin, to take several proofs of it in wax and to go on with the casting in the following manner: The piece of wax is mounted on a metallic wire jet which is terminated by a funnel-shaped piece, it is coated with a special paint or investment used in dentistry; fasten it in the middle of a metal cylinder that is then filled with a mix- 1425
ture of plaster and river sand, also used by dentists. After perfect setting of the plaster, disengage the master-jet and heat the whole to a red heat. Into the cavity produced by the conical piece pour melted metal.

At this moment pull a cover full of moist clay or containing moistened asbestos down on the upper surface of the cylinder and press strongly; the heat from the metal causes violent emission of steam which presses the fluid material into all the interstices of the mould.

The piece obtained by this process of hot moulding, casting under steam pressure, is of absolute perfection.

Apart from the new principle of pouring under pres-

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sure, this process of moulding is the one that has been known for a long time and recommended for casting small objects—leaves, insects, or dentures.

"Place," say the authors, "the piece to be cast in the middle of a cardboard cylinder into which is poured perfectly mixed river mud or plaster mixed with tripoli which, on baking, does not split; be careful to provide vents, so that after calcination of the block it will be possible to blow out the ashes of the object being moulded; if necessary wash the inside of this mould by circulating
1427 mercury in it and, after previous heating, pouring a jet of bronze, silver, or gold."

* * * * *

Captions for Illustrations

1. Furnace made of refractory bricks for large castings.
2. Gas apparatus for casting.
3. Usual casting furnace in refractory clay.
4. Mould ready for casting.
5. Side view of the same.

1428 6. Crucible and stand.

7. Foil ingot mould.
8. Wire ingot mould.

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DIE-CASTING PRACTICE

By

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FIRST EDITION

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The development of an endless variety of alloys both in the ferrous and non-ferrous groups, and the various casting processes are evidences of the increasing and diverse demands of industrial progress. 1431

MODERN CASTING METHODS.—The production of castings in any metal involves the use of a mold conforming to the shape of the desired article and in which molten metal can be poured. An ordinary foundry casting passes through many stages before it is ready for use. The first step is that of imbedding the copy or pattern of the desired casting in molding sand. The sand mold thus

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formed is then opened to remove the pattern. If the latter contains inaccessible interior outlines, they must be formed in other molds to produce cores of corresponding shapes. After the cores are carefully dried and baked, they are introduced into the sand mold which is then closed and ready to receive the molten metal. This procedure is repeated before each pouring operation, because the mold and cores must be destroyed before the casting can be removed from the sand. The adhering sand and core material is then removed before the casting is ready for machining operations.

1433 In spite of the many labor-saving devices found in a modern sand foundry, intensive manufacturing demanded greater product efficiency. As a result, molds are also being constructed in such a manner and of such materials as to render their destruction unnecessary after each casting operation. If, in special cases, such destruction is inevitable, then the aim is to produce a casting of better appearance, denser structure, or greater accuracy than can be produced by ordinary sand-casting methods. The casting itself may be more expensive, but if it reduces the cost of subsequent operations, the process serves its purpose of increasing the product efficiency.

1434 This principle has made rapid strides both in the ferrous and non-ferrous groups and particularly in the latter. The greatest progress, however, has been made in the die-casting process, which is limited to the non-ferrous group of the low melting point alloys.

In view of the unfortunate selection of the term "die casting," which so inadequately differentiates this from related casting processes, and, in view of the fact that its meaning is totally different in America from what it is in England, it would not be out of place to review briefly all the casting methods used outside of the ordi-

nary sand-casting practice. Because of their specialized application, these other methods have received scant attention in our permanent foundry literature. Their relationship may, however, be classified as follows:

1. Single-purpose molds.
2. Multiple-purpose molds.

Classification 2 may be further divided into two groups:

a. Non-metallic molds.

b. Metallic molds. 1436

Non-metallic molds, intended to produce duplicate castings, may be made of various materials, but the most common ones used in highly specialized fields are as follows:

(1) Stereotype molds.

(2) Wooden molds.

(3) Rubber molds.

The metallic molds are by far the most important for quantity production in industry and are adapted to produce the following five types of casting:

1437

(1) Slush casting.

(2) Pressed casting.

(3) Centrifugal casting.

(4) Permanent-mold casting.

(5) Die casting.

1. Single-Purpose Molds

The single-purpose mold, like the ordinary foundry sand mold, is used for the purpose of producing only

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one casting operation and is then destroyed. Its advantage lies in producing castings superior in finish, accuracy, solidity, and in designs that could not be obtained by sand-casting practice. The composition of the mold consists either of a plaster of Paris base or a special sand of very fine texture.

Finished Brass Castings.—Finished brass castings, known in the trade as DO-DI finished castings, are made in a mold of a composition of plaster of Paris as a base, mixed with other ingredients, such as pulverized asbestos,
1439 mica, fire clay, etc. Each half of the mold is made separately by pouring the fluid mixture over an accurately made match plate surrounded by a hinged frame. The match plate carries as many duplicate impressions as the size of the frame will permit, and these impressions are usually die cast in a tin-base alloy to secure high finish and great accuracy. After the plaster is set, the two halves are placed together and dried in rotating ovens to a temperature of 450° F. for 24 to 36 hours, depending upon the size of mold. The molds are then placed on inclined supports, and the brass poured in from a ladle, the same as in a sand foundry.

The alloys generally used consist of 57 to 58 per cent
1440 copper, 40 to 42 per cent zinc, 1 to 3 per cent tin, and a slight amount of aluminum as a flux. The tensil strength varies from 50,000 to 60,000 pounds per square inch with an elongation in 2 inches of from 5 to 20 per cent, the alloy with the highest tin cortent having the smallest elongation. They cast with a clean finish and polish with a minimum amount of preparatory cutting down, the color ranging from light to deep gold.

When ease of machining, such as speed drilling or deep boring, is of greater importance than surface appearance, the tin may be reduced to ½ per cent and lead added from 1 to 2 per cent. The castings then assume a yellow-

color with a whitish tinge and a tendency to show dark scale in spots, due to the presence of lead.

White brass, consisting of 59 per cent copper, 25 per cent zinc, 13.5 per cent manganese, 2 per cent lead, and 0.5 per cent tin is a very desirable alloy for parts that are nickel plated and require frequent handling. Should the plating wear through, the very friction responsible for it will polish the white brass, thus prolonging the good appearance of the part.

The casting limits on finished brass castings vary plus or minus 0.005 inch per inch of length or fraction thereof. Across the parting line, however, variations of plus 1442
or minus 0.008 inch must be expected, due to possible warping of molds. The required draft on the outside of a casting is 0.002 inch per inch of length, twice as great for holes, and five times as great for inside dimensions.

While the mold structure permits plenty of vent, and is well dried and warm when the metal is poured in, still this is no assurance that the casting will be free from porosity unless the design is favorable and the sharp junction of thin and heavy walls is avoided.

Figure 1 illustrates various examples of DO-DI finished brass castings. 1443

ART CASTINGS.—Art castings, particularly those in the nature of statuary, represent very difficult problems in core work, and are sometimes impossible to produce without the use of the *cire-perdue* or "lost wax" process. This method was used centuries ago in China and Japan and later was practiced in Europe until about the middle of the sixteenth century, the last well-known statute being "Perseus," by Benvenuto Cellini. Lately, there has been a tendency to revive the method.

1444 *Plaintiffs' Exhibit P-19*

The first step in the cire-perdue process is to make a plaster or glue mold of the original model produced by the sculptor. The mold is then closed and filled with molten wax which, after a few seconds, is poured out again, thus leaving a thin shell over the surface of the mold, the thickness of the shell being made in proportion to the size of the work. The next step is to open the mold and remove the hollow wax duplicate of the original model, so that the sculptor may supply any finishing touches or alterations deemed advisable. The gates and
1445 vents are then added at suitable points in the form of wax rods of different diameters.

The final mold to receive the metal is started by pouring a liquid, consisting of four parts of plaster of Paris mixed with one part each of fire clay and asbestos fiber, around the outside of the wax figure, and allowing it to harden. The same mixture is next poured into the hollow interior through a suitable hole left for the purpose, thus forming the core, which is supported by wires previously inserted through the outer mold and the wax figure. The mold is then placed, gate down, in an oven until baked. The wax is allowed to run out, after which the mold is ready to receive the molten bronze.

1446 Successful castings have been obtained by using the natural object for a pattern, such as a leaf, a lizard, or a frog, in place of the wax figure or model. After the mold is completed, it is dried and thoroughly baked until the natural object is carbonized. Mercury or a strong blast of air is introduced through the apertures to remove the carbon and leave the mold ready to receive the metal.

Still another method employed in producing statuary is by building up a sectional mold around the sculptor's model. French sand mined in the little village of Fontenay-aux-Roses, on the outskirts of Paris, is used because of its property of consolidating to a high degree without losing its porosity, and also because of its negligible contraction when dried or baked. This sand is compacted with wooden mallets into units of different sizes and shapes conforming to the various undercuts. All these units are then taken apart to permit the removal of the model, after which they are reassembled and the inner surface given a coating of foundry facing so that it may be rammed full of clay. The mold is then dismantled a second time, exposing a clay model of the proposed figure. Since this clay model will eventually be the core for the mold, it is necessary to scrape off its entire surface sufficient clay equivalent to the thickness desired in the finished statue. The mold is reassembled for the last time around the reduced core, which is properly vented and supported. After the usual drying, the mold is ready for the pouring ladle. 1448

Figure 2 illustrates the application of this method to the casting of a bust. The sculptor's plaster model at *B* is shown surrounded by rammed blocks or cores *H*, made of French sand. Foundry sand *H* is used as an outer backing and flask *A* confines the whole assembly. 1449

Figure 3 shows the sculptor's model replaced by the core *E*, held in position by iron rods *F*. The space *I* around the core represents the wall thickness of the finished casting. At *G* is shown the feeding channels for the molten metal, and vents *C* permit the escape of gases generated during the pouring operation.

This method requires very painstaking work over a long period of time, as these outer units may amount to

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a thousand or more in number for intricate work, and yet must be fitted with the utmost accuracy.

DENTAL CASTINGS.—Dental castings, such as base plates and fillings, are also produced in single-purpose molds, known in the profession as the "investment" compound. The investment compound varies somewhat for different alloys, but usually consists of equal parts by measure of silica sand (white lake sand), wash or float silica, and plaster of Paris. Silica sand is a high-fusing, low-expanding and contracting material of coarse texture
1451 which prevents warping or cracking of the compound. The fine silica fills the pores and the plaster serves as a bond. The investment compound can be increased in strength by using a slow-setting plaster.

Alloys.—Alloys of tin, containing bismuth, silver, and gold, have been used for dental base plates since 1855, on account of their low fusing points, and their suitability for gravity pouring. They are being superseded, however, by aluminum because of its superior strength and durability. Gold is also favored but, since it is nearly as soft as lead, it must be alloyed with other metals, such as silver, platinum, copper, or zinc. Zinc
1452 makes the gold hard and brittle but greatly increases its fusibility. Copper also hardens it, and imparts a deep red-yellow color. Platinum alone has little effect on the gold but, in combination with silver and copper, it adds hardness and elasticity while silver serves to modify the color.

Casting Methods.—Dental-casting methods employ four distinct principles: namely, gravity, centrifugal, vacuum, and pressure. The gravity method is an adaptation of

the ordinary sand-casting process, and is applicable only to the low fusing point alloys of the tin group.

The centrifugal method has the advantage of great simplicity, and fills the mold by the force exerted in throwing the metal off on a tangent while being revolved about a center. The wax pattern, with gate and vents attached, is covered with the investment compound in a small bucket. When the investment is partially set, a cavity is dug out, from the top, around the wax sprue, which serves as a crucible in which the metal is molten. The investment is then gradually heated until the free moisture and wax disappear. 1454

A piece of aluminum or gold alloy of suitable size is placed in the crucible and heat applied until molten. The bail is then attached and the swinging of the bucket is started with a steady long motion of the arm, the diameter of the swing being quickly reduced and the speed increased. The motion is continued for about fifty revolutions until the metal is properly set. If the diameter of the sprue is too large, the metal in the crucible, when molten, will drip into it and clog the mold before the operation is started. To insure success, the cohesion of the molten alloy must be greater than the specific gravity of the volume resting over the sprue hole, which 1455
for aluminum does not exceed 3/16-inch diameter.

The vacuum method fills the mold by the difference in pressure of the external air compared with the degree of exhaustion of the confined air in the mold. It is, therefore, a modified form of the pressure machine, with the advantage that heat may be applied while the force is

acting. This method also permits observation of the disappearing metal. The power is limited, however, and manipulation is needed to offset the forward tendency of the force, which is only slightly exerted laterally or backwards.

The pressure method has the greatest range of application and power. The pressure varying from 10 to 20 pounds may be supplied by steam, compressed air, or any other gas, and forces the molten metal in all directions, and may be kept on as long as desired.

1457 Figure 4 shows examples of dental castings and also a gate of inlays.

2. MULTIPLE-PURPOSE MOLDS

a. NON-METALLIC MOLDS.—While composition molds, with plaster of Paris as a base, produce castings of sharp outlines, they cannot be used more than once. Metal molds are of course the most practical ones for quantity productions, but where the quantities are very small, non-metallic molds have been resorted to on account of their lower costs. Such molds are made of asbestos fiber,
1458 paper, wood, and even of rubber.

The term "asbestos" does not represent a material of definite composition, but may be applied to the mineral serpentine which yields flexible and elastic short fibers with silky luster of a yellowish to greenish color, or to the mineral amphibole yielding fibers gray or white in color and of much greater length with a tendency towards brittleness. Although, mineralogically, they are quite distinct from one another they possess the same fire-resistant qualities. The amphibole variety has been

used to better advantage for molds, however, by mixing the fiber with a binder and squeezing a metal pattern into it until the shape of the cavity is formed and the excess binder forced out. The mold is then dried slowly to 800° F. so that the first binder is established. The pattern is then removed and kilned to a higher temperature than that of the pouring metal to be used. Such a mold has been used to produce hundreds of castings of a simple nature with free shrinkage, although the system has not been applied commercially.

(1) *Stereotype Mold.*—After a full page of type is 1460
completed, including any copper or zinc-plate illustrations, the whole assembly is locked in a suitable frame and may be used for printing purposes. Frequently, however, it is used as a pattern to impress its outlines into a sheet consisting of several layers of tissue paper pasted together and backed by damp unsized paper which forms the mold or matrix. When dry, the matrix is mounted in a suitable iron support to receive the molten metal, thus producing the stereotype plate which is a true reproduction of the original page of type to be used for printing. The stereotype plate may be flat, if used on a flat-bed press, or semicylindrical if mounted 1461
on a rotary printing press, as the great advantage of the paper mold is that it can be made to conform to either shape with ease.

Such a mold can be used to cast a number of stereotypes with equal clearness as the alloy used is of a sufficiently low pouring temperature not to injure it. The alloy is a lead-base mixture containing 15 per cent antimony and 3 to 10 per cent tin. It is sufficiently strong to withstand the compressive strain and the abrasive action along the sharp edges of the type face.

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(2) *Wooden Mold.*—Castings produced from wooden molds are used for printing designs. The mold is made of a large block of thoroughly dried wood and the outline is drawn on the end of the block. Steel tools of various shapes are heated with a Bunsen burner to a red heat and the impression is burned in to the required depth. The bottom of the impression forms the printing design on the casting and the lines do not exceed 1/32 inch in width.

Figure 5 illustrates a mold with two separate designs. The upper end is cut away for a gate, and thin strips
1463 are nailed around the edges to form the back of the casting. By holding these strips against a flat surface the mold is ready for pouring.

The castings are made of a low melting-point alloy similar to type metal. Since the walls are very thin, there is not sufficient heat to damage the impression; therefore, 50 to 100 castings can be produced with ease. This quantity is ample for the purpose and is thus produced by a very economical method.

(3) *Rubber Mold.*—For small and complicated metal statues requiring duplication, rubber molds [1] have been found of value. They can be distorted and stretched out
1464 of inaccessible portions to facilitate the removal of the casting. Fusible alloys of low melting points must of necessity be used for rubber molds.

Such an alloy consists of: cadmium, 3 parts; tin, 4 parts; bismuth, 15 parts; and lead, 8 parts. Due to the great variation in specific gravities of the constituents, the mixture must be well stirred to prevent segregation. This alloy melts at 158° F. and is still soft at 18° lower.

These fusible castings, which are readily reproduced in

[1] *Foundry*, Sept. 15, 1925.

rubber molds, replace the usual wax model. The casting is afterwards covered with a fairly thick coating of copper by electro-plating methods. The alloy is then melted out by submerging it in hot water, thus leaving a thin shell of copper which conforms to the finished article. The interior of the shell is then filled solid, either with lead or with bronze, after the exterior is protected against distortion by a layer of plaster supported in sand.

b. METALLIC MOLDS.—Metallic molds are more satisfactory and most widely used for casting purposes. They are made of bronze for the white metal alloys of the lower 1466
melting range, principally for slush castings or of cast iron for the permanent-mold casting of aluminum and iron. Such molds are usually cast to the required shape and afterwards touched up in places where greater detail is required. For die casting, machine steels and heat-treated alloy steels are used where the work involved represents the most skilled and exacting type of die making.

The nature of the mold is governed by the results that may be expected from the following methods of casting:

(1) *Slush Casting.*—The process of slush casting is 1467
used extensively in the manufacture of toys, novelty clocks, candlesticks, jewel boxes, lamp stands, electric-light fixtures, and various other ornamental objects that may be finished in silver, gold, or bronze. The metal used may be zinc or antimonial lead in which the antimony varies from 14 to 18 per cent. Britannia metal is used for the lighter castings such as borders, handles, spouts, and other fancy trimmings for decorative purposes.

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A slush casting may be defined as a hollow casting formed in a metallic mold without the use of cores. The process involves the ladling of metal into a chilled mold to its full capacity, and then immediately pouring or slushing out what remains liquid, thus leaving a thin walled casting chilled by the inside surface of the mold. The mold is often made by casting bronze into a plaster of Paris mold in order to reproduce cheaply the desired outline. It may consist of one piece backed with an asbestos sheet or of several pieces if it involves many undercuts. The mold is usually mounted on trunnions
1469 to facilitate rapid emptying, as the thickness of a slush casting depends upon the length of time that the metal is left in the mold.

A certain amount of skill is needed to produce satisfactory work. The relative temperatures of the mold and alloy, the time element between filling and emptying, and the correct venting have an important bearing on the results. For large work, the die may retain sufficient heat to make it necessary to cool the gate section.

(2) *Pressed Casting.*—A pressed casting involves the
1470 pouring of a measured amount of metal into a mold, the impression of which corresponds to its outer shape. The core which conforms to its inner shape is then immediately brought down into the mold, thus acting as a plunger in forcing the molten metal under considerable pressure to reproduce the finest details into a clean, dense, and accurate casting which is removed after the metal is set and the plunger raised.

This procedure developed in France and sometimes known as the Cothias process, after its inventor, com-

bines elements from several other methods of production, and yet the combination forms a distinct process of its own. It cannot be classified as a forging because the metal is fluid; it is not a permanent-mold process because pressure is applied; yet it cannot be called a true die casting because the metal is first poured under gravity. The results, however, are very satisfactory, although the very nature of the process limits it to relatively simple castings of open design.

(3) *Centrifugal Casting.*—The centrifugal casting is produced as a result of the centrifugal action due to rotation, at high speed, of a mold or die into which a measured amount of molten metal is introduced. Castings having a cylindrical internal form are applicable to this process, although the external shape need not be strictly cylindrical. Some of the advantages of the centrifugal process are the absence of gates, risers, and cores, and rapidity of production with solidity of structure. 1472

Although the use of rotating molds has been attempted since the beginning of the nineteenth century, it was not until 1914 that Dimitri S. De Lavaud reduced it to commercial application in the production of cast-iron pipes. This method produces pipes with a marked increase in strength, both in tension and cross-bending, a more uniform wall thickness of a closer grained structure, and a saving of about 25 per cent in the weight of metal per length of pipe as compared with the sand-cast product. 1473

The mold, which is water cooled, rotates along a horizontal axis and the metal is introduced by means of a long trough discharging it in the plane of revolution first at the remote end and then distributing the metal evenly over the entire length. If the mold is

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rotated in a vertical axis, the outside will still follow the shape of the mold, but the inside will form a paraboloid of revolution. With the axis on an angle, still further complications result; therefore, such modifications are only suitable for short castings, such as piston rings.

The impression that the performance of a centrifugal casting machine is like that of a cream separator, permitting the lighter elements and impurities such as slag and dirt to assume positions nearest the center of rotation is true to only a very limited degree. The viscosity
1475 of the molten metal and the rapidity of chilling determine the extent of separation.

Other metals are cast centrifugally, such as steel, bronze, and brass rings, copper bands for projectiles, and babbitt liners for automobile connecting rods.

A variation of the above principle as applied to objects that are not round has met with some success, especially in the casting of aluminum alloys. A number of ordinary molds, which are filled through radial runners, are mounted near the periphery of a revolving table, and the metal is poured into the gate at the center of the table. The centrifugal action forces the metal to
1476 follow the runners into the impressions.

(4) *Permanent-mold Casting.*—A permanent-mold casting is defined as a casting formed in a metallic mold by pouring it full of molten metal which is at all times solely under the influence of the force of gravity. The term "gravity casting" would be more appropriate for this process, as the word "permanent" neither defines it nor can it be taken literally, as the mold is made of cast iron or steel, or bronze for the low melting point

white metal alloys. The cores are solid or sectional and usually made of steel, although sand cores are used when the shapes are very intricate or for metals of a very high melting point.

This process should not be confused with "chilled casting" which is used in ordinary iron-foundry work. The mold is still made of sand, and blocks of iron are imbedded at points where it is desired to secure a dense structure on the finished casting due to the chilling action of the blocks.

The metallurgical structure of a permanent-mold casting is excellent and is usually superior to that of a die 1478
casting. To obtain the best results the thermal balance of the various portions of the mold and their relation to the pouring temperature of the alloy must be carefully maintained. For the casting must solidify more or less progressively, so that each layer as it freezes will be fed automatically by the fluid metal above it until it reaches the gate which should solidify last. Cores are usually withdrawn before the casting is completely solidified, and then any excessive strains set up in their removal are likely to develop into cracks in the finished casting.

Due to the fact that the weight of the gate is the only 1479
pressure available, permanent-mold castings are seldom cast to a degree of accuracy, so that all machining is eliminated. The process, however, is adaptable for castings that are not too intricate in shape or too thin in wall thickness and where solidity of structure is essential. It has a wide application in the manufacture of lead battery grids and connectors and miscellaneous small parts in aluminum bronze. In aluminum alloys it is universally used for pistons and similar parts requiring heat

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treatment, and its application is being extended to the casting of iron.

Figure 6 shows the Holley molding machine of the turntable type carrying 12 cast-iron molds which are opened and closed either mechanically or by the aid of compressed air. The speed may be varied to suit conditions and can be either indexed or rotated continuously. This machine has been successfully adapted to the production of a great variety of iron castings. The face of the molds is protected by a highly refractory coating which in turn is protected from abrasion and penetration by a thick
1481 coating of lamp black. After each casting has been produced the lamp black is cleaned off with a blast of compressed air and a fresh layer applied by the use of an acetylene torch.

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PATENT SPECIFICATION

Convention Date (Dominion of Canada): Sept. 27, 1934. **449,062**

Application Date (In United Kingdom): Sept. 23, 1935. No. 26300/35.

Complete Specification Accepted: June 19, 1936.

COMPLETE SPECIFICATION

Improvements in Method and Means of Casting Metals

I, THORKIL GROSMOND JENSEN, Engineer, a Subject of the King of Denmark, and resident of 51, Burlington Street, in the Town of Mimico, County of York, Province of Ontario, in the Dominion of Canada, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to methods and means of casting metal and has for its principal object to enable the production by moulding in a commercially economical manner of rings and other articles of jewelry having intricate patterns or designs which have heretofore been cut or shaped by hand.

In the casting of metal it is not broadly new to make an elastic mould from an original sample or model, to produce a wax or fusible pattern with the aid of the elastic mould and to remove the pattern from the latter and invest it in a final mould from which the wax or fusible pattern is subsequently melted out to permit of the pouring of metal into the mould cavity thus vacated.

The accurate reproduction of articles of intricate detail, such as jewelry and rings, which are not only of extremely small size, so that the problem of the rapid setting of the poured metal is involved, but also have an intricate pattern or design cut therein, and are frequently formed with actual cavities or deep undercuts in addition, presents special difficulties. It has been found, however, that a distinctly true fusible model of the original detail can be produced by centrifugally casting the molten wax (or other material having a low fusing point) directly into a resilient mould structure, which has been produced from the original pattern, and also that the intricate detail may be faithfully preserved if the final product be produced by a second centrifugal casting operation in a mould obtained by investing the fusible model.

According to one feature of the invention, therefore, a method of casting rings and other articles of jewelry having intricate patterns or designs is characterised by the centrifugal casting of a model of wax or other readily fusible material within a flexible mould which has been prepared from an original model or sample, effectively to displace the air in the mould cavity and force the model-forming material intimately into all the design and/or pattern-forming recesses of the cavity surface.

According to another feature of the invention, after investing the centrifugally formed model in a mould-forming material and removing it therefrom by fusing, there is finally carried out a second centrifugal casting operation with molten metal to force the same into the fine interstices of the cavity vacated by the fused model.

The principal features of the invention are hereinafter defined step by step in reference to the accompanying drawings, in which Figure 1 is a sectional view of a flexible mould which is built in separable sections around a model of the article to be reproduced.

Figure 2 is a sectional view showing the fusible model of the article to be produced invested in the mould in which the article is to be cast.

Figure 3 is a diagrammatic sectional elevational view illustrating the manner of centrifugal casting of the fusible model and of the metal.

In carrying this invention into effect the designer of a piece of jewelry or any small article to be cast produces a model of the article in wood, metal or other suitable material, and this may have undercut surface perforation of any desirable kind. This model is placed upon a base and a flexible mould-forming material such as rubber, is built up around the model, the top surface of the base being arranged to form a parting line along suitable lines of the model.

This bottom section 1 of the mould is formed with a plurality of dowel or socket holes 2 arranged over the surface thereof closely around the model 3. When the lower mould section is completed the top

section 4 is built thereover to encircle the remaining portion of the model and to form projecting teeth 5 to extend into the guide holes in the lower section 1, the mating faces and guide holes being treated with a non-adhesive coating.

A suitable gate or pouring recess is formed in the meeting faces of the half sections of the mould.

The mould thus constructed is preferably made of rubber and when the rubber material completely surrounds the model it is suitably vulcanized and thus assumes a permanent shape having a cavity the exact shape of the model embedded therein.

This model is removed; the half sections of the mould are placed together and placed in a suitable form of centrifugal casting machine 7.

A suitable quantity of a very low temperature fusing material which may be wax or a very soft metal is poured into the gate and the mould is rotated rapidly in the centrifugal casing machine. The wax or metal is thus forced into the mould and by the centrifugal action displaces the air within the mould, the molten material congealing first against the exposed surfaces of the cavity formed in the mould, and any air which may be trapped in the mould recesses being crowded back into the fluid body under the pressure applied thereto. The fluid material will advance into the recesses as it crowds the air therefrom, and will progressively congeal against the wall of the recesses until the extreme limit is reached so that the finest of cavities will be completely filled.

It is essential that the air be expelled from the mould progressively as the molten material flows in so that all interstices whether undercut or otherwise, are completely filled.

When this step in the method has been completed the mould is removed from the centrifugal machine and the flexible sections are separated.

The flexible rubber material from which the mould is made permits the moulded wax to be withdrawn without injury to undercut surfaces or delicate parts.

The model thus produced is then invested in a material which will form a suitable mould for the metal which it is ultimately desired to form to that shape. The wax may be dipped in a solution of plaster of paris or of silica, and it may then have an investment material poured thereabound, or it may be invested directly in a more or less fluid mass.

This investing material may be dried out in any suitable manner, but is particularly dried in a furnace, but in any event the mould created by the flowing material is subjected to sufficient heat to melt the wax or other material of which the temporary model is made and all traces of this wax are completely burned out from the mould.

The mould is then placed in the centrifugal casting machine and the molten metal from which the casting is to be made is poured into this mould and is projected into the fine recesses by the centrifugal action.

The final result is that an article is cast which is the exact replica of the original model. It will be readily understood that once the original flexible mould is made any desirable number of the models of fusible material may be produced to be invested in metal-receiving material to form moulds and any desirable number of metal casting moulds may thus be produced from the same flexible mould. All will be equally accurate and as the final mould is a complete investment of the wax or other fusible mould, there will be no fins or irregularities to be removed.

The ultimate result is that metal castings of rings, brooches and many pieces of jewelry which are frequently very fine and intricate may be produced at the very minimum of cost.

It will be understood that this process is particularly applicable to the casting of precious metals, but it will also be understood that various other metals may be handled in the same way and particularly base metals of tin and similar alloys.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A method of casting rings and other articles of jewelry having intricate patterns or designs, characterised by the centrifugal casting of a model of wax or other readily fusible material within a flexible mould which has been prepared from an original model or sample, effectively to displace the air in the mould cavity and force the model-forming material intimately into all the design and/or pattern-forming recesses of the cavity surface.

2. A method according to claim 1, characterised in that, after investing said centrifugally formed model in a mould-forming material and removing it therefrom by fusing, there is finally carried out a second centrifugal casting operation with molten metal to force the same into the fine interstices of the cavity vacated by the fused model.

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3. A method as claimed in claim 1 or 2, in which the flexible mould is formed by building a half mould of flexible material around a portion of the original model, then building a second and separable half mould section of flexible material completely to invest the remainder of the model and then treating said flexible material so that it will permanently retain its flexible moulded form, then separating the sections of the flexible mould and removing the model to leave the mould in condition to receive the fluid material which is to form a model to be invested for further removal as described.

4. A method as claimed in claim 3, in which the first formed half section is provided with guide holes in the mating face disposed closely about the embedded model prior to the building thereon of the second half section of the mould, the mating faces and guide holes being treated with a non-adhesive coating and heat and pressure being applied to flow and set the flexible material about the model and to cause the material of the second-mentioned half section to enter the guide holes in the other half section whereby when completed said sections will directly interfit accurately together for the casting of mould-forming models therefrom.

5. A method of casting jewelry or other small articles of intricate design as described in the foregoing specification and illustrated in the accompanying drawings.

Dated this 21st day of September, 1935.

For the Applicant,
RAWORTH, MOSS & COOK,
75, Victoria Street, London, S.W. 1,
Chartered Patent Agents.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1936.

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449,062 COMPLETE SPECIFICATION 1 SHEET

Fig. 1.

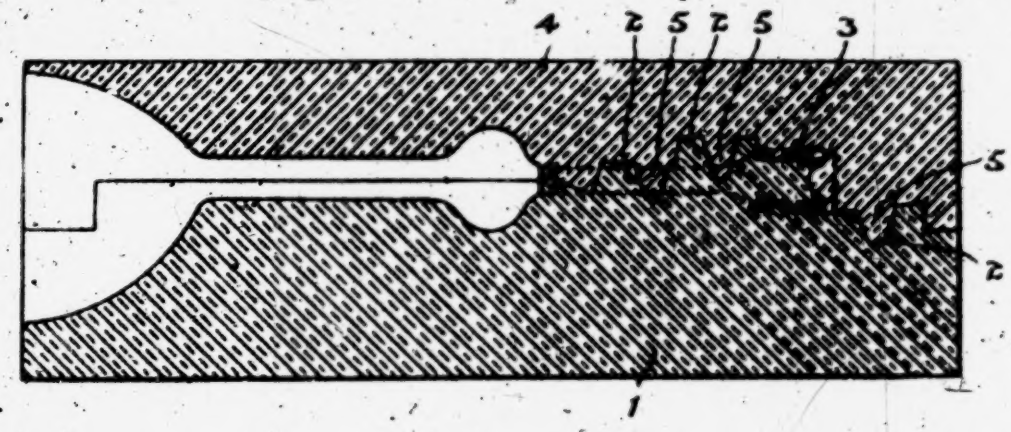
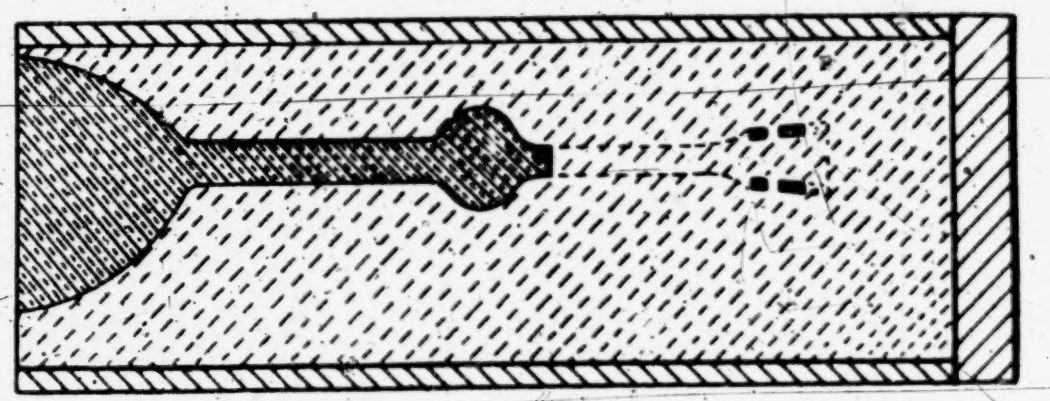


Fig. 2.



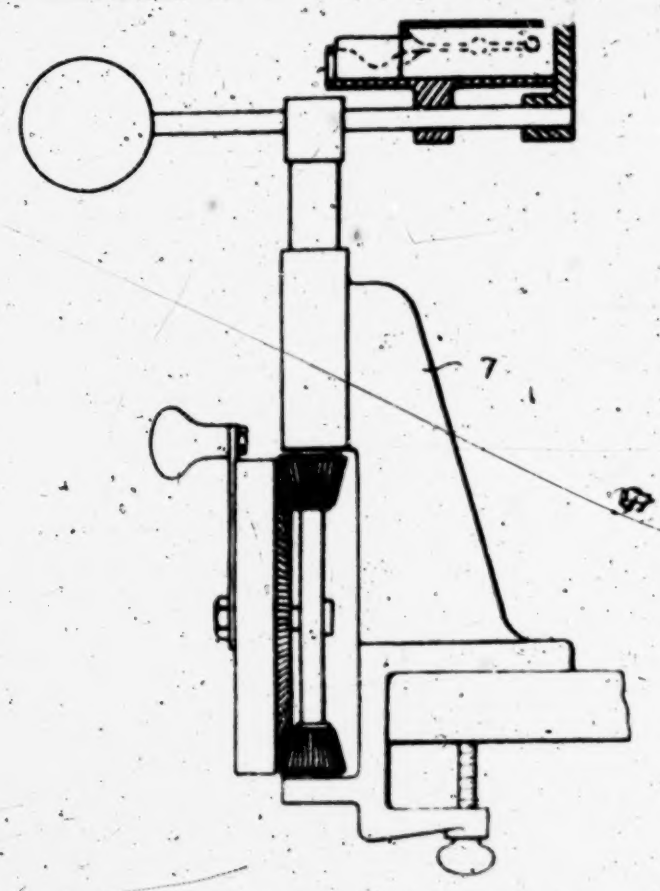


Fig. 3.

[This Drawing is a reproduction of the Original on a reduced scale.]

Appendix

COMPARISON OF THE STEPS AS DISCLOSED IN JUNGERSEN PATENT NO. 2,118,468 WITH THE CORRESPONDING STEPS OF PRIOR ART PROCESSES.

Appendix

COMPARISON OF THE STEPS AS DISCLOSED IN JUNGERSEN PATENT NO. 2,118,468 WITH THE CORRESPONDING STEPS OF PRIOR ART PROCESSES.

The Jungersen Patent (1934)	The Cellini System (16th Cen.)	Spencer No. 748,996 (1904)	Haseltine Br. 2467 (1875)	La Gravure, etc. (1926) (Translation)	Haseltine Br. 2467 (1875)	La Gravure, etc. (1926) (Translation)	Kralund No. 1,238,789 (1917)	The Slatis-Dee Method (1931)	The Austenal Method (1932-1933)
Purpose: "The principal object of this invention is to facilitate the casting of small metal articles, particularly articles of intricate detail such as jewelry" * * * (p. 1, c. 1, ll. 1-4). "It will be understood that this process is particularly applicable to the casting of precious metals, but it will also be understood that various other metals may be handled in the same way and particularly, base metals of tin and similar alloys" (p. 2, c. 1, ll. 51-56).	Purpose: "Casting figures in bronze of life size or a little under" (Cellini, p. 114).	Purpose: "The object of my invention is to make an elastic and substantial mold directly from any plain or intricately-formed pattern it is desired to reproduce without necessarily destroying the said pattern, * * *" (p. 1, ll. 7-11).	Purpose: "The main object of this Invention is to produce a casting in metal from a given pattern, which casting will be a perfect copy of such pattern without requiring much, if any, after finishing or chiselling work. * * *" (p. 4, ll. 34-36; p. 5, l. 1).	Purpose: "We can thus mould quantities of objects of illustration or reproduction, * * *" (p. 4, ll. 38-39).	Purpose: "The main object of this Invention is to produce a casting in metal from a given pattern, which casting will be a perfect copy of such pattern without requiring much, if any, after finishing or chiselling work. * * *" (p. 4, ll. 34-36; p. 5, l. 1).	Purpose: "We can thus mould quantities of objects of illustration or reproduction, * * *" (p. 4, ll. 38-39).	Purpose: "My invention relates to a method or art of making commercial castings, and more particularly to such a method which is especially adapted for the production of castings of large bulk, requiring no machining after completion, to bring them to size, or give the desired finish thereto" (p. 1, ll. 12-18).	Purpose: The manufacture of rings, etc. by a method "whereby you could take an article with undercuts and reproduce it exactly by means of a rubber mold" (CD., pp. 9, 29-30).	Purpose: "* * * the procedure to make rubber molds in which to produce wax patterns for (Steele's) backings" (CD., p. 222; NYD., p. 122).
a) A model of the article to be cast is made "in wood, metal or other suitable material" (p. 1, c. 1, ll. 28-33; and see all claims).	a) "Model the figure you wish to cast direct in the clay and rag composition above described" (Cellini, p. 114).	a) "The pattern may be modeled in * * * intricate form * * * and it may have any number of sides or surfaces or undercut or projecting parts" (p. 2, ll. 9-14).	a) "* * * plaster of Paris, parian marble, and all other mineral substances which may be used for making a model are suitable. "If metal is used for making the model iron, type metal, or lead will be preferable" (p. 7, ll. 5-9).	a) There is no limitation on material of which model is made. Verleye speaks generally of "The model selected for reproduction" (Tr_4, p. 1, l. 1).	a) "* * * plaster of Paris, parian marble, and all other mineral substances which may be used for making a model are suitable. "If metal is used for making the model iron, type metal, or lead will be preferable" (p. 7, ll. 5-9).	a) There is no limitation on material of which model is made. Verleye speaks generally of "The model selected for reproduction" (Tr., p. 1, l. 1).	a) The original model is not referred to.	a) The model used was either a half, or a full, model, made of silver or gold (CD., pp. 12, 30; 38).	a) A commercial precious metal Steele's backing was the original model (CD., pp. 222, 245; NYD., pp. 122-123, 166).
b) "This model is placed upon a base and a flexible mould-forming material such as rubber, is built up around the model" (p. 1, c. 1, ll. 33-37) and vulcanized (p. 1, c. 1, ll. 48-55; and see claims 1-4).	b) "There are divers ways of making the gesso (Plaster-of-Paris, or Gypsum—Webster's New International Dictionary) moulds. The best * * * is to make as many small pieces as when put together would make a complete man, and that without any undercutting * * * Each time that one of these small pieces is finished it must be tested, and you must see if you get a good impression from it & if the piece relieves * * *" (Cellini, p. 115).	b) "It consists of an elastic mold made, preferably, of rubber * * *. The pattern A, Fig. 1, and the form for the pouring head are coated with a comparatively thin coating of rubber in an unvulcanized state, the thickness of the coating varying with the form and size of the pattern * * * the mold B thus formed is vulcanized in any suitable manner, without removing the pattern" (p. 1, ll. 52-62).	b) "When the first original model is procured the operator takes a solution (properly mixed) of india-rubber in benzine, and with a brush applies over the model or pattern a thin coat of such solution, * * * The first layer of rubber must be laid on very carefully, * * * The first layer or coat of rubber being laid on, all over, and around the model a second layer is added, and so on until the rubber lies on the model to a thickness of about a quarter of an inch * * * What is to be obtained is a thickness of rubber which will retain its shape after vulcanizing, and bear its own weight without collapsing the elastic mould" (p. 7, ll. 15-33).	b) "When it is required to obtain a mould from a piece which is not smooth, place the model, suitably immersed in wax, in such a way that the mould forms two shells * * * On the piece thus prepared and enclosed in its metal band, after having poured out the alcohol, pour the gelatin mixture and allow it to cool. At the end of two hours, it is time to proceed with the pouring of the other face" (Tr., p. 3, ll. 36-42; p. 4, ll. 1-6). "The mould thus obtained is perfectly elastic; plaster, wax, or gelatin may be poured into it hot without fear of destroying it, * * *" (Tr., p. 3, ll. 32-34).	b) "When the first original model is procured the operator takes a solution (properly mixed) of india-rubber in benzine, and with a brush applies over the model or pattern a thin coat of such solution, * * * The first layer of rubber must be laid on very carefully, * * * The first layer or coat of rubber being laid on, all over, and around the model a second layer is added, and so on until the rubber lies on the model to a thickness of about a quarter of an inch * * * What is to be obtained is a thickness of rubber which will retain its shape after vulcanizing, and bear its own weight without collapsing the elastic mould" (p. 7, ll. 15-33).	b) "When it is required to obtain a mould from a piece which is not smooth, place the model, suitably immersed in wax, in such a way that the mould forms two shells * * * On the piece thus prepared and enclosed in its metal band, after having poured out the alcohol, pour the gelatin mixture and allow it to cool. At the end of two hours, it is time to proceed with the pouring of the other face" (Tr., p. 3, ll. 36-42; p. 4, ll. 1-6). "The mould thus obtained is perfectly elastic; plaster, wax, or gelatin may be poured into it hot without fear of destroying it, * * *" (Tr., p. 3, ll. 32-34).	b) "In the practice of my method or art, I make a (metal) sectional mold or die having sunk therein a cavity, the contour and dimensions of which correspond with exactitude to the casting to be produced" (p. 2, ll. 51-55; see also, l. 22).	b) "The ring is mounted first * * * (on) a piece of wax or plasterscene * * * Then the thing is covered with rubber, with liquid-rubber * * * You cover just the outer surface, while the inner surface is blocked out * * * another layer of rubber of a different color, sec., preferably black and white, you know, is then covered from the inside and over the outer surface of the rubber of the first layer. A suitable separating medium is placed on the rubber so that the other one wouldn't stick to this one * * * The rubber is backed up with plaster * * * To give it strength, and it helps to hold the rubber shell in place" (CD., pp. 13-14, 39-49).	b) "Well, the technique was to take a standard precious metal (Steele's) backing, and to mount it in a flask, a vulcanizing flask we call it; and then to pack in rubber * * * And then to vulcanize it to the extent that it would still remain elastic. And then we would strip it off from the pattern" (NYD., pp. 123, 166-169; CD., pp. 222, 245).
c) After removing the model from the finished mould "A suitable quantity of a very low temperature fusing material which may be wax or a metallic alloy such as Wood's metal is poured into the gate and the mould is rotated rapidly in the centrifugal casting machine" (p. 1, c. 2, ll. 5-9; and see claims 1-4).	c) "Then you make the inlet holes in which you want to pour your wax, * * * "After this you can heat your wax, &, when it is well molten, pour it in * * *" (Cellini, p. 117).	c) "The mold being closed and held closed by suitable means, such as the sectional casing described, the reproduction is made by pouring into the mold the material G, Fig. 7, desired either in a liquid, semiliquid, or fused state, * * *" (p. 6, ll. 67-72).	c) "In this elastic mould an opening is cut at the proper place for the introduction of melted wax, resin, or paraffine, or a compound of these or other analogous material * * * Then the rubber mould is suspended in cold water for the purpose of cooling the wax and retaining the rubber mould in shape. Then the melted wax is poured slowly into the rubber mould at the opening cut for that purpose until full." (p. 8, ll. 20-23, ll. 28-31).	c) "Whether the mould has one face or two, it is now ready to reproduce the desired imprint. If this impression is to be made in wax, go over the surface of the mould with a brush barely moistened with spirit of turpentine, which produces the same results as alcohol, draws out bubbles and evaporates. * * * the principal advantage is the obtaining of waxes in every way similar to the model and which, cast in cire perdue give perfect reproductions almost without retouching." (Tr., p. 4, ll. 27-31, 34-36).	c) held e sec- action e ma- iquid, (p. 6, | c) "In this elastic mould an opening is cut at the proper place for the introduction of melted wax, resin, or paraffine, or a compound of these or other analogous material * * * Then the rubber mould is suspended in cold water for the purpose of cooling the wax and retaining the rubber mould in shape. Then the melted wax is poured slowly into the rubber mould at the opening cut for that purpose until full." (p. 8, ll. 20-23, ll. 28-31).	c) "Whether the mould has one face or two, it is now ready to reproduce the desired imprint. If this impression is to be made in wax, go over the surface of the mould with a brush barely moistened with spirit of turpentine, which produces the same results as alcohol, draws out bubbles and evaporates. * * * the principal advantage is the obtaining of waxes in every way similar to the model and which, cast in cire perdue give perfect reproductions almost without retouching." (Tr., p. 4, ll. 27-31, 34-36).	c) This die is adapted for use in an ordinary pressure die casting apparatus, by means of which the cavity formed by the portions a'—b' of the mold sections a—b is filled with a low fusing material such as wax, or a metal alloy having a low fusing point, to form a pattern which may be used in making a mold from suitable plastic material such as plaster of Paris or gypsum" (p. 2, ll. 58-67; see also, ll. 20-22, 72-75).	c) "The next step is to make a wax replica from the mold. I mean to pour wax into the mold and get wax replicas from your original model * * * The wax is cast centrifugally (on) * * * a home-made machine that was made by Winn and left with me" (CD., pp. 14, 41-43).	c) "Then we produced wax patterns which were made in the rubber mold * * * We did it in two ways, as far as I remember * * * Then (the second way) we used an eye-dropper, picked up the molten wax and squirted the wax into the rubber mold" (CD., pp. 222, 223, 237-238, 245; NYD., pp. 123, 125, 170, 178-179).
d) "The pattern thus produced is then invested in a material which will form a suitable mould for the metal which it is ultimately desired to form to that shape" (p. 1, c. 2, ll. 33-36; and see claims 2 & 4).	d) "After this I took some tripoli (soft deposits of silica—Webster's New International Dictionary) * * * & made from it a pigment as for painting, streaking it over the wax ornaments * * * When I had applied the first coat of tripoli I let it dry. Then I took the clay of which I told you before & coated the work over to the thickness of a knife's back, letting it dry again, and repeating this process, till the different coats were about a finger thick. * * *" (Cellini, p. 87; see also, p. 89).	d) "This reproduction is then used as a pattern, about which is formed a mold of any comparatively infusible material, said mold to be constructed as a homogenous whole or in sections, as desired" (p. 7, ll. 41-45).	d) "The second part of this Invention relates to the forming of a loam mould around a pattern of wax, resin, or paraffine cast in the elastic mould. "This object is effected in the following manner.—A fine slush of clay or loam is prepared suitable for making loam moulds for casting metals. This slush or paste of clay is applied to the wax pattern with a brush * * * Then the same is covered with a body of finely-ground brick or other burned clay" (p. 9, ll. 10-18).	d) "The piece of wax is mounted on a metallic wire jet which is terminated by a funnel-shaped piece, it is coated with a special paint or investment used in dentistry; fasten it in the middle of a metal cylinder that is then filled with a mixture of plaster and river sand, also used by dentists" (Tr., p. 5, ll. 32-37).	d) as a dd of said mous p. 7,	d) "The second part of this Invention relates to the forming of a loam mould around a pattern of wax, resin, or paraffine cast in the elastic mould. "This object is effected in the following manner.—A fine slush of clay or loam is prepared suitable for making loam moulds for casting metals. This slush or paste of clay is applied to the wax pattern with a brush * * * Then the same is covered with a body of finely-ground brick or other burned clay" (p. 9, ll. 10-18).	d) "The piece of wax is mounted on a metallic wire jet which is terminated by a funnel-shaped piece, it is coated with a special paint or investment used in dentistry; fasten it in the middle of a metal cylinder that is then filled with a mixture of plaster and river sand, also used by dentists" (Tr., p. 5, ll. 32-37).	d) "The rest of the procedure is common knowledge to the dental profession * * * It (the pattern) is invested in a plaster-like material * * * You pour this plaster-like material over it, and that is commonly known as investing in the dental trade" (CD., p. 20).	d) "In the making of a denture, of course, a wax pattern is made of the denture as it is finally to be constructed * * * This wax pattern is invested in refractory material * * *" (NYD., pp. 124, 174-175, 179; CD., pp. 224, 246).
e) "This investiag material may be dried out in any suitable manner * * * but in any event the mould created by the flowing material is subjected to sufficient heat to melt the wax or other material of which the temporary pattern is made and all traces of this wax are completely removed from the mould" (p. 1, c. 2, ll. 41-47; and see claims 2 & 4).	e) "Then I applied the whole to a slow fire, holding the vent holes downward, and so gradually melted out the wax, which I caught in a little receptacle down beneath * * *" (Cellini, pp. 87-88; see also, pp. 89, 118).	e) "The pattern is then removed by melting out or otherwise, leaving the mold in condition after it is dried to have cast into it any material desired" (p. 7, ll. 45-49).	e) "When a number of such moulds are ready, and nearly dry, they are placed into a moderately heated oven to gradually melt out the wax, resin, paraffin, or composition pattern, if the same has been used * * * This done the heat is gradually raised until the mould is at a low red heat, so as to burn out all the wax, and render the mould strong and hard, and ready for casting" (p. 11, ll. 10-17).	e) "After perfect setting of the plaster, disengage the master-jet and heat the whole to a red heat" ("In 'lost wax' casting, the model, exactly inclosed in sand and with a master jet easily disengaged, is then destroyed by heat; the wax melts, flows and leaves a cavity into which the metal flows directly, * * *") (Tr., p. 5, ll. 37-58 and ll. 23-26).	e) melt- ld in cast 7, ll.	e) "When a number of such moulds are ready, and nearly dry, they are placed into a moderately heated oven to gradually melt out the wax, resin, paraffin, or composition pattern, if the same has been used * * * This done the heat is gradually raised until the mould is at a low red heat, so as to burn out all the wax, and render the mould strong and hard, and ready for casting" (p. 11, ll. 10-17).	e) "After perfect setting of the plaster, disengage the master-jet and heat the whole to a red heat" ("In 'lost wax' casting, the model, exactly inclosed in sand and with a master jet easily disengaged, is then destroyed by heat; the wax melts, flows and leaves a cavity into which the metal flows directly, * * *") (Tr., p. 5, ll. 37-58 and ll. 23-26).	e) "When the plastic material has solidified or set sufficiently, it is subjected to a heat at a temperature slightly above the fusing point of the material of the pattern, this metal when melted escaping through the opening formed by the sprue f' (p. 2, ll. 96-102).	e) "Then the wax is burned out * * * It formed a cavity of your original model in that plaster material; * * *" (CD., pp. 20-21).	e) "* * * after the refractory material has set, the wax is burned out by heat, leaving a cavity, which exactly reproduces the shape of the original wax pattern, * * *" (NYD., pp. 124, 175-176, 180; CD., pp. 224, 246).
f) "The mould (investment) is then placed in the centrifugal casting machine and the molten metal from which the casting is to be made is poured into this mould and is projected under applied force into the fine recesses preferably by the centrifugal action" (p. 1, c. 2, ll. 48-53; and see claims 2 & 4).	f) Cellini does not use pressure. He simply pours the metal in the mould (Cellini, p. 88; see also, pp. 119-122).	f) The mold has "cast into it any material desired" (p. 7, ll. 48-49).	f) "Every practical metal founder is aware that if a mould is made of too fine and dense material, the metal cannot be made to lie closely to the mould and produce a perfect casting of the same, unless some means for introducing the metal be employed other than simply pouring it into the mould from the melting pot, as in the usual mode of casting * * *. (Here, the mould) "requires more than the pressure or weight of a short gate or riser (as now used on castings), if the metal is to lie to the dense mould and produce a sharp and well defined casting. To accomplish this object an apparatus or furnace is employed, which is so constructed as to be a pressure of about 20 pounds to the square inch on the fluid, metal. * * * This apparatus consists of a melting pot arranged and resting on a stand pipe of about six feet in height" (p. 11, ll. 36-37; p. 12, ll. 1-16)	f) "Into the cavity produced by the conical piece pour melted metal. "At this moment pull a cover full of moist clay or containing moistened asbestos down on the upper surface of the cylinder and press strongly; the heat from the metal causes violent emission of steam which presses the fluid material into all the interstices of the mould. "The piece obtained by this process of hot moulding, casting under steam pressure, is of absolute perfection" (Tr., p. 5, ll. 38-44; p. 6, ll. 1-2).	f) terial	f) "Every practical metal founder is aware that if a mould is made of too fine and dense material, the metal cannot be made to lie closely to the mould and produce a perfect casting of the same, unless some means for introducing the metal be employed other than simply pouring it into the mould from the melting pot, as in the usual mode of casting * * * (Here, the mould) "requires more than the pressure or weight of a short gate or riser (as now used on castings), if the metal is to lie to the dense mould and produce a sharp and well defined casting. To accomplish this object an apparatus or furnace is employed, which is so constructed as to be a pressure of about 20 pounds to the square inch on the fluid metal. * * * This apparatus consists of a melting pot arranged and resting on a stand pipe of about six feet in height" (p. 11, ll. 36-37; p. 12, ll. 1-16)	f) "Into the cavity produced by the conical piece pour melted metal. "At this moment pull a cover full of moist clay or containing moistened asbestos down on the upper surface of the cylinder and press strongly; the heat from the metal causes violent emission of steam which presses the fluid material into all the interstices of the mould. "The piece obtained by this process of hot moulding, casting under steam pressure, is of absolute perfection". (Tr., p. 5, ll. 38-44; p. 6, ll. 1-2).	f) "When the plaster mold has been thus made, metal having the desired properties for a finished casting is poured or otherwise introduced into this plastic material, as by means of a pressure die casting apparatus in which metal is cast under very low pressures, the ordinary die casting method of die pressures being impracticable with a mold as fragile as the one above referred to" (p. 2, ll. 111-119). "In making complicated castings, it is sometimes necessary to apply slight pressure to the molten metal while it is flowing into the plaster mold" (p. 3, ll. 18-21).	f) "* * * then you forced your metals centrifugally, or by compressed air machine, which I used at that time, into the mold formed by the wax" (CD., p. 21).	f) "* * * then this mold is placed in a casting machine, which is usually one of two types—either a centrifugal casting machine or a pressure type casting machine—and the metal is melted in an adjacent small crucible, and then, after it is melted, either by air pressure or centrifugal force, the metal is forced into the mold, filling the mold cavity, * * *" (NYD., pp. 124, 176, 180; CD., pp. 224, 246).

1498 **Plaintiffs' Exhibit P-22.**

AGREEMENT between Al Stein and Ostby and Barton Company

Re: SPECIAL CASTING PROCESS

It is agreed that Ostby and Barton Company will pay to Mr. Al Stein, 32 Marshall Street, Newark, N. J., Five Hundred Dollars ($500.00) for instructions which he will give such of our designated employees as we choose, so that they may successfully operate the process of casting shown Mr. Alfred E. Dixon and Mr. William L. Marchant.

1499 The information given shall be complete and sufficient so that the persons instructed may be able to operate without any further assistance and the payment shall be as follows:

First Payment	—$150.00	on the signing of this agreement.
Second "	—$150.00	after completion of first day of teaching.
Third "	—$200.00	which is the balance, after molds have been completed, and to satisfaction of Ostby & Barton Company whose decision shall be final.

1500

Instructions shall begin on April 6, 1936.

It is agreed that this information shall be kept within the company and no person not in the employ of Ostby & Barton Company shall be instructed in the process.

Signed this 28th, day of March, 1936.

OSTBY AND BARTON COMPANY
by R. J. Gregg
Secretary

Al. Stein

Defendant's Exhibit D-1.

May 24, 1938. T. G. JUNGERSEN 2,118,468

METHOD OF CASTING ARTICLES OF INTRICATE DESIGN AND A PRODUCT THEREOF

Filed Sept. 28, 1934

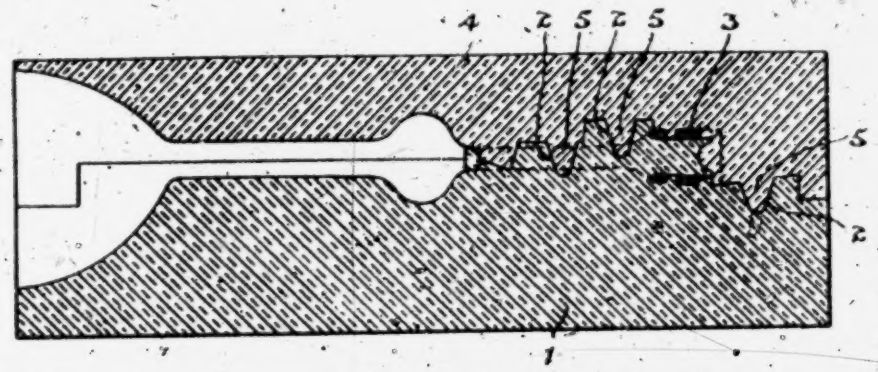


Fig. 1.

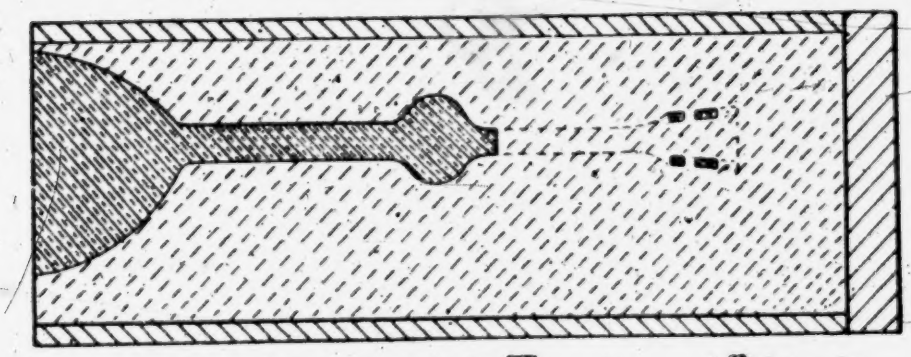


Fig. 2.

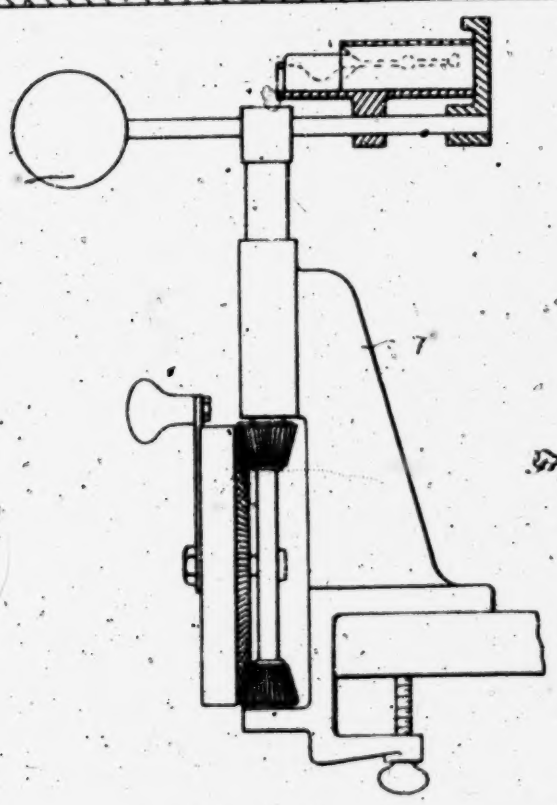


Fig. 3.

Inventor.
Theger G Jungersen
by A. J. Ellenwood
Atty

Defendant's Exhibit D-1

Patented May 24, 1938 2,118,468

UNITED STATES PATENT OFFICE

2,118,468

METHOD OF CASTING ARTICLES OF INTRICATE DESIGN AND A PRODUCT THEREOF

Thoger G. Jungersen, Mimico, Ontario, Canada

Application September 28, 1934, Serial No. 745,893

6 Claims. (Cl. 22—190)

The principal object of this invention is to facilitate the casting of small metal articles, particularly articles of intricate detail such as jewelry which frequently are designed with hollows, undercut portions and perforations, so that they will have a smooth clean surface faithful in detail to the original and free from imperfections or holes, and to enable such result being accomplished with the minimum of expense.

A further object of the invention is to enable the formation of intricate castings which will so closely resemble the original and finished product that the slow and tedious work of patterning and detail cutting required in connection with present casting methods is eliminated.

The principal features of the invention are hereinafter defined step by step in reference to the accompanying drawing, in which Figure 1 is a sectional view of a flexible mould which is built in separable sections around a model of the article to be reproduced.

Figure 2 is a sectional view showing the fusible model of the article to be produced invested in the mould in which the article is to be cast.

Figure 3 is a diagrammatic sectional elevational view illustrating the manner of centrifugal casting of the fusible model and of the metal.

In carrying this invention into effect the designer of a piece of jewelry or any small article to be cast produces a model of the article in wood, metal or other suitable material, and this may have undercut surfaces, hollows or perforations of any desirable kind. This model is placed upon a base and a flexible mould-forming material such as rubber, is built up around the model, the top surface being arranged to form a parting line along suitable lines of the model.

This bottom section 1 of the mould is formed with a plurality of dowel or socket holes 2 arranged over the surface thereof closely around the model 3. When the lower mould section is completed the top section 4 is built thereover to encircle the remaining portion of the model and to form projecting teeth 5 to extend into the guide holes in the lower section 1.

A suitable gate or pouring recess is formed in the meeting faces of the half sections of the mould.

The mould thus constructed is preferably made of rubber and when the rubber material completely surrounds the model it is suitably vulcanized and caused to flow intimately about the detail structure of the model and thus assumes a permanent shape having a cavity the exact shape and detail of the model embedded therein.

This mould is then separated and the model is removed and the half sections of the mould are brought together again and placed in a suitable form of centrifugal casting machine 7.

A suitable quantity of a very low temperature fusing material which may be wax or a metallic alloy such as Wood's metal is poured into the gate and the mould is rotated rapidly in the centrifugal casting machine. The wax or metal is thus forced into the mould and by the centrifugal action displaces the air within the mould, the molten material congealing first against the exposed surfaces of the cavity formed in the mould and any air which may be trapped in a recess of the mould will be crowded back into the fluid body under the pressure applied thereto and the fluid material will advance into the recess as it crowds the air therefrom and will progressively congeal against the wall of the recess until the extreme limit is reached so that the finest of cavities will be completely filled.

It is essential that the air be expelled from the mould progressively as the molten material flows in so that all interstices whether undercut or otherwise, are completely filled.

When this step in the method has been completed the mould is removed from the centrifugal machine and the flexible sections are separated.

The flexible rubber material from which the mould is made permits the moulded wax to be withdrawn without injury to undercut surfaces or delicate parts.

The pattern thus produced is then invested in a material which will form a suitable mould for the metal which it is ultimately desired to form to that shape. The wax may be dipped in a solution of plaster of Paris or of silica, and it may then have an investment material such as plaster of Paris poured therearound, or it may be invested directly in a more or less fluid mass.

This investing material may be dried out in any suitable manner, but is preferably dried in a furnace, but in any event the mould created by the flowing material is subjected to sufficient heat to melt the wax or other material of which the temporary pattern is made and all traces of this wax are completely removed from the mould.

The mould is then placed in the centrifugal casting machine and the molten metal from which the casting is to be made is poured into this mould and is projected under applied force into the fine recesses preferably by the centrifugal action. Finally, the mould is separated from the casting.

The final result is that an article is cast which

is the exact replica of the original model. It will be readily understood that once the original flexible mould is made any desirable number of the patterns of fusible material may be produced to be invested in metal-receiving material to form moulds and any desirable number of metal casting moulds may thus be produced from the same model. All will be equally accurate and as the final mould is a complete investment of the wax or other fusible pattern, there will be a minimum of irregularities to be removed.

The ultimate result is that metal castings of rings, brooches and many pieces of jewelry which are frequently very fine and intricate, may be produced at the very minimum of cost. For example, with known processes of casting rings, it may take an expert jewelry worker several hours to finish a ring to a certain standard after casting, while with the present process only fifteen to thirty minutes may be required to finish a ring to the same standard. These figures are for ordinary rings, such as "Exhibit A" on file herein. With finer work in platinum, from twelve to fifteen dollars' worth of labor may be expended in making a ring by hand by known methods, while as little as ten minutes would cover the time of casting the same ring by the present process, and the time necessary for finishing it might cost as little as one dollar, or about one-twelfth of the cost of finishing the ring by known methods. The process of the present invention will produce rings on a quantity basis without the necessity of making dies,—a huge saving in itself, since a good set of dies costs from $100 to perhaps $1000. As compared with this excessive investment which the use of dies requires, the present process makes rings and other articles of jewelry at a total cost of from $2 to $3.50 for the first mould. Thus a manufacturer employing this process may effect large savings in capital investment in dies and in precious metals (since a large number of rings etc., must be made at the same time from a die in order to justify the expense of a die, while only a few rings need be made from a mould made in accordance with this invention to pay for the cost of the mould several times over). Hence it is clear that the process of the present invention may effect savings up to 90% in the cost of production, especially if the production is for orders of less than 1000.

It will be understood that this process is particularly applicable to the casting of precious metals, but it will also be understood that various other metals may be handled in the same way and particularly, base metals of tin and similar alloys.

What I claim as my invention is:—

1. A method of casting articles of jewelry of intricate design consisting in first producing a model of the article to be cast, then forming about said model a primary mould of a plastic material which will retain a lasting shape through subsequent treatment, then removing the model from the primary mould, then by centrifugal action forcing into the primary mould molten wax or other material of a low fusing point that will not injure the primary mould to form a pattern, and employing the patterns so made for the manufacture of casting moulds.

2. A method of casting articles of jewelry of intricate design consisting in, first, making a model of the article desired to be cast, then forming a primary mould in separable sections thereabout of plastic material capable of assuming intimate contact with the intricate designs of the model and adapted to retain the assumed shape, then removing the model, then by centrifugal force projecting into the mould cavity and completely filling same a molten material of a low fusing point which will not injure the mould, then removing the fusible pattern so cast, then investing said pattern in a refractory material which will assume all the contours of its intricate design to form a secondary mould, then heat treating said investment removing the low fusing pattern therefrom, then by centrifugal force projecting molten metal into the heat treated mould, and finally removing said mould from the cast article.

3. A method of casting articles of jewelry as claimed in claim 1 in which the plastic material of which the primary mould is formed is treated to retain its assumed shape and after such treatment remains flexible and is flexed in the act of removing the model to withdraw the mould material from the intricacies of the model.

4. A method of casting articles of jewelry as claimed in claim 2 in which the pattern formed by projecting the pattern material into the primary mould under applied force and thereby provided with a surface free from imperfections is invested with a fluid coating of a finely ground refractory material, said refractory material being built up to a thickness sufficient to withstand the stresses to be applied by forcing molten metal thereinto to form the article to be produced.

5. A method of casting an article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions, comprising first producing a model of the article to be cast, then forming about said model a primary mould, then removing the model from the primary mould, then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould molten wax or other material of low fusing point that will not injure the primary mould to form a pattern, and employing the patterns so made for the manufacture of a casting mould.

6. An article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions made by a process comprising first producing a model of the article to be cast, then forming about said model a primary mould, then removing the model from the primary mould, then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould, molten wax or other material of low fusing point that will not injure the primary mould to form a pattern, and employing the pattern so made for the manufacture of a casting mould.

THOGER G. JUNGERSEN.

Defendant's Exhibit D-7. 1519

THE EVENING TELEGRAM, TORONTO,

MONDAY, DECEMBER 4, 1933

WANTED—Experienced sand caster for jewellery work. S. Fremes & Co., Ltd., 333 Adelaide st. west.

YOUNG man, experienced car mechanic, to take complete charge of garage, state experience and references. Box 478 Telegram.

1520

1521

1522 **Defendant's Exhibit D-9.**

PATENTS APPEAL TRIBUNAL.

Royal Courts of Justice.
Wednesday, 1st December, 1937.

Before:
MR. JUSTICE LUXMOORE.

In the matter of THE PATENTS AND DESIGNS ACTS 1907 to 1932
and
In the matter of THE APPLICATION BY THOGER GRONBORG
1523 JUNGERSEN for Letters Patent No. 449,062
and
In the matter of THE OPPOSITION OF JOHNSON, MATTHEY & COMPANY LIMITED thereto.

APPEAL OF APPLICANT FROM THE DECISION OF THE SUPERINTENDING EXAMINER

(Transcript of the Shorthand Notes of Marten, Meredith & Co., 8 New Court, Carey Street, London, W. C. 2.)

MR. R. MORITZ, K.C., and MR. G. W. TOOKEY appeared as Counsel for the Appellant (Applicant).
1524 No appearance on behalf of the Opponents (Respondents).
MR. H. W. MONROE appeared on behalf of the Comptroller General of Patents ets.

Judgment of The Patents Appeal Tribunal.

Mr. Justice Luxmoore: This is an appeal from a decision of Mr. Cousin acting for the Comptroller General, dated 22nd June, 1937. The decision was given in opposition proceedings under section 11, the opponents being the well known firm of jewellery makers, Messrs. Johnson Matthey and Company Limited. Mr. Cousin decided to

 1525

refuse the patent and the applicant; Mr. Jungersen, appeals from that decision.

Since the decision, the opponents, Messrs. Johnson Matthey & Company Limited, have entered into a commercial arrangement with the applicant, with the result that they no longer appear to oppose the grant of a patent. In those circumstances, Mr. Monroe, representing the office, has appeared and argued in support of Mr. Cousin's decision. I am indeed grateful to him for the care and trouble he has taken in the argument he has addressed to me in the matter.

1526

The point I think is really in a small compass. The application is in respect of specification No. 449,062. The title of the specification is: "Improvements in method and means of casting metals." I do not know whether that title has been happily chosen, for when one reads the specification it is plain that the method and means of casting metals is confined to rings and other articles of jewellery having intricate patterns or designs and has not the wide significance that one would at first sight think the patent might have from reading the title. The position at the date of the application appears to have been this: There was a well known process of casting metals. It has five stages. The first was making a model. 1527
This was done by the craftsman and was usually done in a metal like silver. The second step was to make a casting of the model in soft rubber in two parts which were so contrived that they were brought into perfect alignment. After the model had been embedded in the soft rubber, the rubber was vulcanized. The third step in the process was to place the two halves of the mould together and fill the mould with wax or some other substance which had a low melting point. The rubber mould was then taken apart and the model in wax, or other substance of low melting point, was easily removed from it. The fourth step in the process was to take the second

1528 *Defendant's Exhibit D-9*

model and enclose it in plaster, so that a plaster mould was made round this second model. A hole was made in the plaster and the mould was heated, so that the wax or other substance poured out leaving a cavity in the plaster. The fifth step was to pour the gold or other metal into the hollow mould and then break the plaster away in order to get the finished article. As I understand it, that method, although well known, had never been used in the making of small articles of jewellery because of the difficulty in making the wax model—what I have called the second model. That appears from the
1529 evidence to have been the subject of considerable activity in the jewellery trade, but there had never been a successful application of that particular process in the jewellery trade. There had been a number of patents in which the final metal had been inserted into the mould by centrifugal means, but so far as the evidence goes, the centrifugal means had never been applied to the insertion of the wax into the plaster mould. It was because of the difficulty of getting the wax into the plaster mould that this particular process was not applied to the jewellery trade. The evidence which was before Mr. Cousin when he dealt with the case showed that the application of this
1530 process to jewellery was a great advance in the trade. I will read, as a typical example of the evidence which was before Mr. Cousin, the evidence of Mr. Shaw, who describes the invention the subject matter of the patent in question in these terms: it "consists in forming a mould from a model, casting a temporary pattern from the mould, investing same with a refractory material, melting out the temporary pattern and centrifugally casting the metal article desired therein." He further says: "this process is eminently satisfactory and enables the manufacture of rings and other jewellery and precious and semi-precious metals at very low cost and is in my opinion the greatest advance in the jewellery trade for

a number of years. Then he says that he has had an opportunity of conferring with a number of jewellery manufacturing firms in the United States who are operating this process, and that they are highly enthusiastic and consider the process to be a very distinct and unique advance in the art of making jewellery. He concludes by saying that his firm "Since taking a license to operate this process has, since December 1935 manufactured large quantities of rings and other articles of jewellery by said process, and in the course of approximately one year, changed over almost entirely to the use of this process 1532
in the manufacture of rings and other precious and semi-precious jewellery and that this process has enabled us to manufacture rings from platinum by a casting method which I believe has never been previously accomplished."

Since the case was before Mr. Cousin, further evidence has been put in with my sanction in the form of a declaration by Mr. Harold Victor Tyler, who has been engaged in the trade, according to his declaration, for over twenty years. He says: "I have a full practical knowledge of all the methods which have been employed in the manufacture of intricate articles of jewellery over that period." Then he says: "I have carefully studied the method of manufacturing jewellery described in the specification of application for British Letters Patent No. 449,062 in the name of Thoger Gronberg Jungersen. I have personally carried out the method of casting jewellery which is claimed in the claims appended to said British patent specification No. 449,062. The results produced by the carrying out of this method have been highly satisfactory and so far as my knowledge extends are entirely new in the trade. (4). The method claimed in claim 1 of specification No. 449,062 comprises the step of centrifugally casting a model of wax or other readily fusible material within a flexible mould which has been prepared from an original model or sample, effectively to displace

1534 *Defendant's Exhibit D-9*

the air in the mould cavity and force the model forming material intimately into all the designs or pattern forming recesses of the cavity surface. This method had produced highly successful results in practice and the combination of steps constituting the method were not obvious to me despite my very lengthy practical experience in the manufacture of intricate articles of jewellery." Then Mr. Tyler says in paragraph 6 of his declaration: "From my own practical experience I know that manufacturers of jewellery, metallurgists and refiners
1535 have attempted over a large number of years to evolve a process whereby intricate articles of jewellery could be produced by a casting operation. Prior to Mr. Jungersen's discovery and invention of the process claimed in specification No. 449,062, however, no successful process for the casting of intricate articles of jewellery has been produced."

Mr. Cousin in his decision says at page 7:. "It is agreed that on the evidence there is no disclosure of the casting of the wax or like model in a flexible mould in a centrifugal casting machine." Then he goes on to say: "This step forms the invention of the applicant's claim 1, and the question before me is whether such use
1536 of a centrifugal casting machine in carrying out one step of an admittedly known sequence constitutes an inventive step to justify the grant of letters patent."

The real question is whether that is an obvious step or not. The evidence shows clearly that there was a long-felt want for a method of casting articles of the particular nature which can be produced by this invention; that in spite of the long-felt want, the solution to the difficulty was not found until Mr. Jungersen's invention was made. In those circumstances I think it would be impossible for me to hold that the step is obvious. If it is not obvious, then the process is one which is entitled to be protected. At any rate, at this stage of the proceedings,

putting it at its lowest, in view of the evidence which has been filed it must certainly be open to doubt and in his case, as in all cases where there is any doubt, the applicant has the benefit of it. I think Mr. Cousin took a wrong view in not accepting the evidence which was before him, but it is only fair to say that the evidence has been very much strengthened by the declaration of Mr. Tyler, which was not before Mr. Cousin.

In my judgment the order should be set aside. I direct that a patent should be sealed in favor of Mr. Jungersen in respect of his application No. 449,062.

1538 Mr. Justice Luxmoore: Have they been given notice to come here?

Mr. Moritz: Yes, my Lord.

Mr. Justice Luxmoore: No alteration was made in your patent at all?

Mr. Moritz: None whatever, my Lord. I understand that your Lordship has in the past taken the simple course of making an order for double the costs which have been order to be paid by the unsuccessful party below to the successful party here. Really all I am asking your Lordship for is a reversal of the order as to costs below in my favour.

1539 Mr. Justice Luxmoore: They have not come here and, if they do not come, they are still liable to pay costs?

Mr. Moritz: Yes, my Lord.

Mr. Justice Luxmoore: Then I will reverse the order in the Court below and direct that in lieu of that order the opponents shall pay you seven guineas for your costs in the Court below and seven guineas for your costs in this Court.

1540 **Defendant's Exhibit D-16.**

(Cut): Coro Pears and Coro Jewelry

COHN & ROSENBERGER, Inc.
Importers and Manufacturers
167 Point Street
PROVIDENCE, R. I.

Paris
22 Rue Saint Georges

Pforzheim
15 Blumenstrasse

1541 Kobe
98 Isobe Dori 4 Chome

Gablonz
21 Parkstrasse

N. Y. Office
47 West 34th St.

Toronto
Wellington & York Sts.

Cable Address
"Jewelcraft" N. Y.

Telephone
Gaspee 3892

1542

Jan. 10th, 1935.

Mr. T. Jungersen,
51 Burlington St.,
Mimico, Ontario, Canada.

Dear Mr. Jungersen:

As we will need more material for moulds, would kindly ask you to see that more is sent to us on receipt of this letter. Please answer so I know that this is being attended to.

With kindest regards, I remain

Sincerely,

P. B. PARIS

PBM-MM

LIBRARY
SUPREME COURT, U.S.

TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1948

No. 48

THOGER GRONBERG JUNGERSEN, PETITIONER,

vs.

ROBERT BADEN, ROSE BADEN, ALBERT FOSS, ET AL., ETC.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT

PETITION FOR CERTIORARI FILED APRIL 30, 1948.

CERTIORARI GRANTED JUNE 7, 1948.

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Thoger G. Jungersen:
Direct .....
Cross .....
Re-direct .....
Re-cross .....
Edmund Debler:
Direct .....
Cross .....
Jacob H. Schaeffer:
Direct .....
Cross .....

Defendants' Witnesses—Prima Facie:

Robert Baden:
Direct .....
George Schneider:
Direct .....
Cross .....
Re-direct .....
Re-cross .....
Sami Tour:
Direct .....
Cross .....

Plaintiff's Witness—Rebuttal:

Joseph Robinson:
Direct .....
Cross .....

Defendants' Witness—Surrebuttal:

Sami Tour:
Direct .....
Cross .....

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United States Circuit Court of Appeals

FOR THE SECOND CIRCUIT.

194 THOGER GRONBERG JUNGERSEN,
Plaintiff-Appellant,

Page

vs.

200 ROBERT BADEN, ROSE BADEN, ALBERT
203 Foss and GLADYS FOSS, Co-partners,
doing business under the name of
Baden and Foss,
204 Defendants-Appellees,
205 AXEL BROS., Inc., *et al.*,
Intervenors-Appellees.

206
207
208

Statement Under Rule XV (6).

209 This case was commenced February 14, 1944 in the
209 United States District Court for the Southern District
216 of New York. The complaint of plaintiff Thoger Gron-
220 berg Jungersen was filed on the date of commencement
221 of this action, *i.e.*, February 14, 1944 against defendants
222 Robert Baden, Rose Baden, Albert Foss and Gladys Foss,
Co-partners, doing business under the name of Baden and
Foss. The answer and counterclaim of said defendants
was filed on March 7, 1944. A reply to the counterclaim
contained in the aforesaid answer was filed on June 13,
1945. Thereafter, upon motion, an order was filed on No-
vember 21, 1946, allowing the following to intervene as
parties-defendant:

Axel Bros., Inc.

Harry Berland, Seymour Berland, Annie Berland, Sherle Berland, and Jean Berland, Co-partners, doing business under the name of Joseph Berland.

A. Blumstein, Inc.

Statement Under Rule XV(6)

Harry Cohan and Max Cohan, Co-partners, doing business under the name of The Cohan Co.

Feature Ring Co., Inc.

Jacob Flyer and Herman Flyer, Co-partners, doing business under the name of J. & H Flyer.

David Klebanoff and Samuel Grossman, Co-partners, doing business under the name of Klebanoff & Grossman.

O. M. Resen, Inc.

Harry Rosenberg Co., Inc.

Rothman & Schneider, Inc.

Louis Witkin, doing business under the name of Witkin Precision Casting.

Subsequently Arthur Celona, Louis Dolgov and David Selikoff, Co-partners doing business as the Model Ring Company, and Skalet Manufacturing Company, Inc. intervened as additional parties-defendant pursuant to stipulation and order filed January 3, 1947. The answer of said intervenors was previously filed on November 15, 1946. A reply to the counterclaim contained in the answer of said intervenors was filed on January 3, 1947.

Except as above stated, no change has taken place in the parties or their attorneys since the commencement of the action.

The original defendants and the intervening defendants were not arrested, no bail was taken, and no property was attached or arrested. A trial was had on November 25 and 26, 1946 before Honorable Simon H. Rifkind, District Judge, at New York, N. Y. No question was referred to a Commissioner or Commissioners, Master or Referee.

Final judgment was entered on April 23, 1947. Plaintiff's notice of appeal from said judgment was filed on July 17, 1947.

3

Complaint.

(Filed Feb. 14, 1944.)

IN THE

UNITED STATES DISTRICT COURT,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

THOGER GRONBERG JUNGERSEN, Plaintiff, vs. ROBERT BADEN, ROSE BADEN, ALBERT FOSS and GLADYS FOSS, Co-partners, doing business under the name of Baden and Foss, Defendants.	Civil Action No. 24-221. Infringement of U. S. Patent No. 2,118,468.

To the Honorable Judges of the District Court of the United States in and for the Southern District of New York:

For complaint against defendants, plaintiff avers:

1. Plaintiff, Thoger Gronberg Jungersen, is a resident of Summit, New Jersey, and a citizen of the United States.

2. Plaintiff believes the defendants, Robert Baden, Rose Baden, Albert Foss and Gladys Foss, are co-partners doing business under the name of Baden & Foss, and that said defendants maintain an established place of business at 21 West 47th Street, in the Borough of Manhattan, City and State of New York, and have operated said business in said New York City, New York, as such co-partnership since on or about October 29, 1942.

10 *Complaint*

3. Plaintiff further believes that on or about November 17, 1942, said defendants, operating as said co-partnership, acquired all of the assets and assumed all of the liabilities of Baden & Foss, Inc., a New York corporation, which was organized on or about February 4, 1938, and which conducted the business now conducted by said defendants as said co-partnership in the City of New York, State of New York, and that said defendants, operating as said co-partnership, on and after about November 17, 1942, continued to carry on the business previously carried on by said Baden & Foss, Inc., a New
11 York corporation.

4. Jurisdiction of this Court is based upon the patent laws of the United States.

5. Thoger Gronberg Jungersen being, within the meaning of the statutes of the United States then in force, the original, first and sole inventor of "Method of Casting Articles of Intricate Design and a Product Therefor," and being entitled to a patent thereon under the provisions of said statutes, did, on September 28, 1934, duly file in the United States Patent Office application Serial Number 745,893, for Letters Patent of the United States
12 on said invention.

6. All of the requirements of the then existing statutes of the United States and Rules of Practice of the United States Patent Office having been complied with, Letters Patent No. 2,118,468 were duly issued to plaintiff.

7. Defendants and Baden & Foss, Inc., a New York corporation, predecessor of said defendants in the conduct of their business at 21 West 47th Street, in the Borough of Manhattan, City and State of New York, since the issuance of said Letters Patent No. 2,118,468, and prior to the commencement of this action, have infringed said Letters Patent and it is believed will continue to so in-

fringe by selling or causing to be sold within this district and elsewhere within the United States, articles in accordance with and embodying the invention set forth in plaintiff's patent No. 2,118,468, and by practicing and causing others to practice within this District and elsewhere within the United States the inventions set forth in plaintiff's patent No. 2,118,468, all wilfully and without consent of the plaintiff.

8. Plaintiff, prior to the bringing of this action, has given the defendants written notice of such infringement.

9. Plaintiff's patent to Jungersen No. 2,118,468 has already been adjudicated and found to be valid in the following cases:

Jungersen v. Morris Kaysen Company—Civil Action No. 358—District Court for the Eastern District of Pennsylvania—44 U. S. P. Q. 257

Jungersen v. Jenkins, trading as Jenkins Jewelry Manufacturing Co. et al—Civil Action No. 216—District Court for the District of Maryland—43 U. S. P. Q. 448

Jungersen v. A. Mazia and Son, Inc. and Fred Williamson—Civil Action No. 957—District Court for the Eastern District of Pennsylvania—Consent decree granted August 28, 1940

Jungersen v. James A. Apffel Co., a corporation, James A. Apffel, and W. C. Ramstein—Civil Action No. 1163-Y—District Court for the Southern District of California—Consent decree granted November 30, 1940

Jungersen v. Sears-Roebuck & Company—Civil Action No. 1238—District Court for the Eastern District of Pennsylvania—Consent decree granted April 17, 1941

16 *Complaint*

Thoger Gronberg Jungersen v. Johnson, Matthey & Company Limited, English Patents Appeal Tribunal, Royal Courts of Justice, decided December 1, 1937, by Mr. Justice Luxmoore

Thoger Gronberg Jungersen v. John Louis Schwarz, doing business as Variety Jewelry Company—Civil Action No. 15-296—District Court for the Southern District of New York

Thoger Gronberg Jungersen v. Harry Koppel—Civil Action No. 21-478—District Court for the Southern Dis-
17 trict of New York—Consent decree filed July 16, 1943.

10. That the jewelry industry in the United States and in other countries throughout the world has generally recognized plaintiff's patent No. 2,118,468 and the merits of the invention set forth therein by accepting licenses under plaintiff's said United States Patent No. 2,118,468 and corresponding foreign patents and changing from the accepted prior known methods of manufacture to plaintiff's patented process.

11. That such jewelry industry has found, by actual practice in the field, that plaintiff's patented process has
18 been successful and has resulted in a great saving of labor and expense and has also made possible the production of jewelry of attractive intricate designs at moderate cost which designs otherwise could only be produced at such relatively high cost as to inhibit the sale thereof in quantities.

WHEREFORE, plaintiff prays for the judgment of this Court:

1. For the damages caused plaintiff by the herein complained of infringements, together with the profits resulting from said infringements to the defendants and each of them and to their predecessor in business, Baden &

Foss, Inc., a New York corporation, and that said damages to be paid by the defendants to plaintiff be trebled in view of the wilful and deliberate nature of the infringements;

2. That said plaintiff's patent No. 2,118,468 be declared valid;

3. That the acts of the defendants and each of them be declared to constitute an infringement of plaintiff's patent No. 2,118,468;

4. That a permanent injunction during the term of said Letters Patent No. 2,118,468 be issued, enjoining and restraining the defendants and each of them, their associates, attorneys, clerks, agents, servants, workmen and employees and each of them from directly or indirectly making or causing to be made, using or causing to be used, selling or causing to be sold, advertising or offering for sale, or causing to be advertised or offered for sale, agreeing or contracting to sell, causing to be agreed or contracted for sale, supplying or causing to be supplied, threatening to offer or contract for sale, or supply, or disposing of in any manner, articles embodying or employing the teaching or teachings of said Letters Patent No. 2,118,468 or any substantial material or vital part or parts thereof, and from infringing upon or contributing or abetting the infringement of said Letters Patent, or in any way whatsoever;

5. That plaintiff be entitled to an accounting for damages and an assessment for costs against the defendants and each of them.

6. That defendants deliver up to plaintiff all molds, including metal and rubber molds, wax patterns and other matter used or intended to be used in connection with the process or articles taught by Letters Patent No. 2,118,468,

which are in the possession or under the control of the defendants to the end and purpose that the same may be destroyed.

7. That the defendants deliver to plaintiff any and all finished article or articles in the process of fabrication in their possession or under their control, which are embodied in plaintiff's patent to the end and purpose that the same may be destroyed; and

8. For such additional relief as this Court may deem just.

23

THOGER GRONBERG JUNGERSEN
By /s/ VICTOR D. WERNER
Victor D. Werner
19 Rector Street
New York 6, N. Y.
Attorney for Plaintiff

/s/ KARL W. FLOCKS by Victor D. Werner
Karl W. Flocks
Munsey Building
Washington, D. C.
of Counsel for Plaintiff

24 /s/ DRURY W. COOPER, SR. by Victor D. Werner
Drury W. Cooper, Sr.
233 Broadway
New York 7, N. Y.
Of Counsel for Plaintiff

Answer.

(Filed Mar. 7, 1944.)

IN THE

UNITED STATES DISTRICT COURT,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

For answer to the complaint, defendants allege as follows:

FIRST DEFENSE

The complaint fails to state a claim against any defendant upon which relief can be granted.

SECOND DEFENSE

1-4. Admit the allegations of paragraphs 1 through 4 of said complaint.

5. Deny each and every allegation of paragraph 5, except that defendants admit that an application, serial number 745,893, was filed by plaintiff on September 28, 1934.

6. Deny each and every allegation of paragraph 6, except that defendants admit Letters Patent 2,118,468 were issued to plaintiff.

7. Deny each and every allegation of paragraph 7 of the complaint.

8. Admit that defendants were given written notice prior to the bringing of this action, but deny any alleged infringement.

28 *Answer*

9, 10, 11. Deny, upon information and belief, each and every allegation of paragraphs 9, 10 and 11, except defendants admit that the citations set forth in paragraph 9 are to actions in which the patent in suit and other patents of plaintiff were alleged by plaintiff to be valid and infringed, and defendants aver that in none of said actions were defenses set up herein considered or in any way adjudicated, and none is in any way binding upon defendants or any one or more of them.

THIRD DEFENSE

29

12. The patent in suit, No. 2,118,468, is, upon information and belief, invalid and void, because Thogger Gronberg Jungersen, the alleged inventor, was not the original and first inventor of the alleged improvements described and claimed therein, but the same, in all their material and substantial parts, were invented, known to and used by others in this country before his alleged invention or discovery thereof, were patented and described in printed publications in this and foreign countries before his alleged invention or discovery thereof and more than two years prior to his application for patent, and
30 were in public use and on sale in this country more than two years prior to his said application.

(a) That the patents and publications referred to, in so far as they have at present been ascertained are as follows:

PATENTS

Patentee	Number	Date
Spencer	748,996	January 5, 1904
Haseltine (British)	2,467/1875	January 8, 1876

PRINTED PUBLICATIONS

La Gravure, La Ciselure, Le Modelage, by Leon Verleye

and by others as yet unknown to defendants, but as to which defendants beg leave to advise the Court by amendment to this answer.

(b) That the instances of prior invention, prior knowledge and use by others, and prior public use and sale above referred to, in so far as they have at present been ascertained, are by the patentees of the patents, and by the authors of the printed publications set forth in subparagraph 8(a) above, and at the places set forth in said patents and printed publications, and elsewhere, and by—

Austenal Laboratories, Inc.
34 West 33rd Street, New York, N. Y.
and Chicago, Illinois, at New York
and Chicago

Abraham Slatis
Room 708, 30 N. Dearborn Street
Chicago, Illinois, at Chicago and
Thomas J. Dee & Company
1900 West Kinsie Street
Chicago, Illinois, also at Chicago,

Kaspar and Esh, Inc.
126 West 46th Street
New York, N. Y., at New York,

and by others as yet unknown to defendants, but as to whom defendants beg leave to advise the Court by amendment to this answer.

FOURTH DEFENSE

13. The patent in suit, No. 2,118,468 is, upon information and belief, invalid and void for each of the following reasons:

(a) Because the alleged inventions described and claimed therein did not constitute patentable subject matter within the meaning of the law;

(b) Because no invention was required to devise and perfect the alleged invention described and claimed therein, in view of the state of the art existing prior to the alleged invention;

(c) Because the claims of the said patent No. 2,118,468 are indefinite, ambiguous and uncertain and do not particularly point out and distinctly claim the part, improvement or combination which the patentee claims as his invention or discovery;

(d) Because the said Thoger Gronberg Jungersen did not duly comply in all respects with the conditions and requirements of the United States statutes in such cases made and provided for the prosecution of the patent application upon which said patent No. 2,118,468 was granted, and that prosecution of said application before the Patent Office was unlawful and was not in compliance in all respects with the applicable statutes and the rules of the United States Patent Office.

FIFTH DEFENSE

14. Upon information and belief that by reason of the proceedings in the United States Patent Office during the prosecution of the Letters Patent in suit and the admissions and the representations made therein by and on behalf of the applicant to induce the grant of said patent, plaintiff is estopped to claim for said patent a construction, were the same otherwise possible, such as would cause said patent to cover or include the acts of the defendants of which the plaintiff here complains.

SIXTH DEFENSE

15. Defendants and defendants' predecessor, Baden & Foss, Inc., relying upon the failure of plaintiff, who as early as 1938, if not before, had full knowledge and information concerning the methods and products of defendants and their predecessor, to assert any claim until July 16, 1943 against them, did enlarge and expand their business, as to which plaintiff asserts infringement of patent No. 2,118,468, wherefore plaintiff is estopped now to assert any claim of any nature whatsoever for 38
alleged infringement of said patent; and said inaction of plaintiff for a period of many years constitutes laches debarring plaintiff from asserting any such claim.

COUNTERCLAIM

16. Defendants, further answering the complaint, by way of counterclaim for a declaratory judgment under Judicial Code §274(d) (28 USC §400), arising from an actual controversy between them and plaintiff, aver, upon information and belief, that plaintiff has recently asserted and claimed, and now asserts and claims, that the defendants have infringed the patent in suit, No. 2,118,468, 39
and that, on the contrary, defendants have contended and asserted, and now contend and assert, that any alleged rights of plaintiff under said patent are not and have not been violated by defendants and plaintiff has no rights against defendants or any one or more of them thereunder, because the said patent is invalid and void for the reasons above set forth in paragraphs 5 through 15 of this answer, the allegations of which are here repeated and incorporated by reference.

WHEREFORE defendants pray:

(1) That patent No. 2,118,468 be adjudged invalid and void and not infringed by a process or product of defendants;

(2) That the Court declare that defendants have the right to continue to manufacture, use and sell products without threats or interference of any character by or from plaintiff;

(3) That the Court declare the rights and legal relations of the respective parties as to the controversy or controversies herein set forth;

(4) That an injunction issue perpetually enjoining plaintiff, or anyone in privity with him, from bringing or prosecuting, or threatening to bring or prosecute any civil action charging infringement of said patent No. 2,118,468, or any claim or claims thereof, against defendants, their agents, vendees, or others in privity with them, or any one of more of them;

(5) That the complaint herein be dismissed with costs to defendants and that the Court grant such other and further relief as shall be just.

March 6, 1944.

JOHN VAUGHAN GRONER
JOHN B. CUNINGHAM
Attorneys for Defendants.
FISH, RICHARDSON & NEAVE
20 Exchange Place
New York (5), N. Y.

Reply.

(Filed June 13, 1945.)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

Reply of plaintiff to the Counterclaim of Defendants:

1. Plaintiff for answer to paragraph numbered 16 of the Counterclaim, admits that there is an actual controversy between plaintiff and defendants and that he has recently asserted and claimed and now asserts and claims that the defendants have infringed the patent in suit, No. 2,118,468, and that defendants have contended and asserted, and now contend and assert, that any rights of plaintiff under said patent are not and have not been violated by defendants and that plaintiff has no rights against defendants or any one or more of them thereunder, but he denies each and every of the other allegations contained in said paragraph, and reasserts, repeats and incorporates here by reference the entire complaint the same as if here specifically repeated.

VICTOR D. WERNER
19 Rector Street,
New York 6, N. Y.,
Attorney for Plaintiff.

Karl W. Flocks
Munsey Building,
Washington, D. C.,
Of Counsel for Plaintiff.

Drury W. Cooper
233 Broadway,
New York 7, N. Y.,
Of Counsel for Plaintiff.

46 **Order Granting Motion to Intervene.**

(Filed Nov. 21, 1946)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

This cause came on to be heard upon the motion for intervention of the following parties:

Axel Bros., Inc.

Harry Berland, Seymour Berland, Annie Berland, Sherle Berland, and Jean Berland, Co-partners, doing
47 business under the name of Joseph Berland.

A. Blumstein, Inc.

Henry Cohan and Max Cohan, Co-partners, doing business under the name of The Cohan Co.

Feature Ring Co., Inc.

Jacob Flyer and Herman Flyer, Co-partners, doing business under the name of J. & H. Flyer.

David Klebanoff and Samuel Grossman, Co-partners, doing business under the name of Klebanoff & Grossman.

O. M. Resen, Inc.

Harry Rosenberg Co., Inc.

48 Rothman & Schneider, Inc.

Louis Witkin, doing business under the name of Witkin Precision Casting.

and it appearing that reason therefor exists;

IT IS ORDERED that said motion be granted and the answer heretofore filed herein by the said applicants for intervention upon the hearing of their motion to intervene be taken as and for their answer.

Date: November 20, 1946

EDWARD A. CONGER
United States District Judge

Approved as to Form:
Drury W. Cooper
Counsel for Plaintiff
John Vaughan Groner
Counsel for Defendants

Intervenors' Answer.

(Filed November 15, 1946)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

THEGER GRONBERG JUNGERSEN, Plaintiff, vs. ROBERT BADEN, ROSE BADEN, ALBERT FOSS and GLADYS FOSS, Co-Partners, doing business under the name of BADEN & FOSS, Defendants, AXEL BROS., INC., *et al.*, Intervenors.	Civil Action No. 24/221

INTERVENORS

1. The present intervenors are as follows:

Axel Bros., Inc., a New York corporation, having its place of business at 64 West 48th Street, New York, N. Y.

Harry Berland, Seymour Berland, Annie Berland, Sherle Berland and Jean Berland, Co-Partners, doing business under the name of Joseph Berland, having their place of business at 6 West 48th Street, New York, N. Y.

A. Blumstein, Inc., a New York corporation, having its place of business at 37 West 47th Street, New York, N. Y.

Henry Cohan and Max Cohan, Co-Partners, doing business under the name of The Cohan Co., having their place of business at 16 East 52nd Street, New York, N. Y.

52 *Intervenors' Answer*

Feature Ring Co., Inc., a New York corporation, having its place of business at 126 West 46th Street, New York, N. Y.

Jacob Flyer and Herman Flyer, Co-Partners, doing business under the name of J. & H. Flyer, having their place of business at 37 West 47th Street, New York, N. Y.

David Klebanoff and Samuel Grossman, Co-Partners, doing business under the name of Klebanoff & Grossman, having their place of business at 74 West 46th Street,
53 New York, N. Y.

O. M. Resen, Inc., a New York corporation, having its place of business at 62 West 47th Street, New York, N. Y.

Harry Rosenberg Co., Inc., a New York corporation, having its place of business at 64 Fulton Street, New York, N. Y.

Rothman & Schneider, Inc., a New York corporation, having its place of business at 2 West 47th Street, New York, N. Y.

Louis Witkin, doing business under the name of Witkin Precision Casting, having his place of business at 201 East 126th Street, New York, N. Y.

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2. Intervenors aver that each of them has manufactured articles of jewelry by one or more of the processes which defendants have used in their manufacture of jewelry and which are charged by plaintiff to infringe the Jungersen patent in suit, No. 2,118,468. Intervenors further aver that, by mutual agreement among themselves and with defendants, intervenors have openly participated in and contributed to the defense of this suit, to the knowledge of plaintiff.

Intervenors' Answer

First Defense

3. Intervenors admit the allegations of paragraphs 1 and 4 of the complaint, but make no answer to paragraphs 2 and 3 since those do not pertain to intervenors.

4. Intervenors deny every allegation of paragraph 5 of the complaint, except that intervenors admit that patent application serial No. 745,893 was filed by plaintiff on September 28, 1934.

5. Intervenors deny each and every allegation of paragraph 6, except that intervenors admit that Letters Patent No. 2,118,468 were issued to plaintiff.

6. Intervenors deny every allegation of paragraph 7 of the complaint, and further aver that none of intervenors has in any respect infringed the patent in suit.

7. Intervenors make no answer to paragraph 8 of the complaint, since it does not pertain to them.

8. Upon information and belief, intervenors deny every allegation of paragraphs 9, 10 and 11 of the complaint, except that intervenors admit that the citations set forth in paragraph 9 of the complaint identify actions in which the patent in suit and other patents of plaintiff were alleged by plaintiff to be valid and infringed. Intervenors aver that in none of said actions were the defenses herein set up considered or in any way adjudicated, and none of said actions is in any way binding upon defendants or intervenors or any of them.

Second Defense

9. The patent in suit, No. 2,118,468, is, upon information and belief, invalid and void, because Thoger Gronberg Jungersen, the alleged inventor, was not the orig-

58 *Intervenors' Answer*

inal and first inventor of the alleged improvements described and claimed therein, but the same, in all their material and substantial parts, were invented, known to and used by others in this country before his alleged invention or discovery thereof, were patented and described in printed publications in this and foreign countries before his alleged invention or discovery thereof and more than two years prior to his application for patent, and were in public use and on sale in this country more than two years prior to his said application.

59 (a) The patents and publications referred to, in so far as they have at present been ascertained, are as follows:

PATENTS

Patentee	Patent No.	Patent Date
Spencer	748,996	Jan. 5, 1904
Kralund	1,238,789	Sept. 4, 1917
Haseltine (British)	2,467/1875	1875

PRINTED PUBLICATIONS

60

Title	Author	Date
"The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture"	Cellini (English translation)	16th Cent.
"La Gravure, La Ciselure, La Modelage"	Leon Verleye	Paris, 1924 (Received in U. S., 1926)

and others at present unknown to intervenors, but which, when ascertained, intervenors request leave to add by amendment to this answer.

(b) The instances of prior invention, prior knowledge and use by others, and prior public use and sale above referred to, in so far as they have at present been ascertained, are by the patentees of the patents, and by the authors of the printed publications set forth in paragraph 9(a) above, and at the places set forth in said patents and printed publications, and elsewhere, and by—

Austenal Laboratories, Inc. 34 West 33rd Street, New York, N. Y., and Chicago, Illinois, at New York and Chicago

Abraham Slatis, Room 708, 30 N. Dearborn 62
Street, Chicago, Illinois, at Chicago, and Thomas J. Dee & Company, 1900 West Kinzie Street, Chicago, Illinois, also at Chicago

and by others as yet unknown to intervenors, but which, when ascertained, intervenors request leave to add by amendment to this answer.

Third Defense

10. The patent in suit, No. 2,118,468, is, upon information and belief, invalid and void for each of the following reasons: 63

(a) Because the alleged invention described and claimed therein did not constitute patentable subject-matter within the meaning of the law;

(b) Because no invention was required to devise and perfect the alleged invention described and claimed therein, in view of the state of the art existing prior to the alleged invention;

(c) Because the claims of the said patent No. 2,118,468 are indefinite, ambiguous and uncertain and do not particularly point out and distinctly claim the part, improvement or combination which the patentee claims as his invention or discovery;

64 *Intervenors' Answer*

(d) Because the said Thoger Gronberg Jungersen did not duly comply in all respects with the conditions and requirements of the United States statutes in such cases made and provided for the prosecution of the patent application upon which said patent No. 2,118,468 was granted, and that prosecution of said application before the Patent Office was unlawful and was not in compliance in all respects with the applicable statutes and the rules of the United States Patent Office.

Fourth Defense

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11. Upon information and belief, the proceedings in the United States Patent Office during the prosecution of the patent in suit and the admissions and representations made therein by and on behalf of the applicant to induce the grant of said patent, estop plaintiff from claiming for said patent a construction, were the same otherwise possible, such as would cause said patent to cover or include the acts of defendants or intervenors which the plaintiff has charged to infringe said patent.

Counterclaim

66

16. By way of counterclaim for declaratory judgment under Judicial Code, Section 274(d) (28 USC Sec. 400), arising from actual controversy between plaintiff and each of the intervenors, intervenors aver, upon information and belief, that plaintiff has asserted and claimed, and now asserts and claims, that intervenors have infringed the patent in suit; that, on the contrary, intervenors have contended and asserted, and now contend and assert, that no alleged rights of plaintiff under said patent have been or now are violated by any of the intervenors; and that plaintiff has no rights against intervenors or any of them thereunder, because none

of the intervenors has infringed said patent in any respect and because said patent is invalid and void, all as above set forth in paragraphs 3 through 15 of this answer, the allegations of which are hereby repeated and incorporated by reference herein.

WHEREFORE, intervenors pray:

(1) That Patent No. 2,118,468 in suit be adjudged invalid and void and not infringed by any process or product of intervenors.

(3) That the Court declare that intervenors have the 68
right to continue to manufacture, use and sell products without threats or interference of any character by or from plaintiff in respect of said patent.

(4) That the Court declare the rights and the legal relations of the respective parties as to the controversy or controversies herein set forth.

(5) That an injunction issue perpetually enjoining plaintiff or anyone in privity with him from bringing or prosecuting, or threatening to bring or prosecute, any civil action charging infringement of said patent or any claim or claims thereof, against defendants or their 69
predecessors, intervenors or their respective predecessors, their agents, vendees or others in privity with them or any of them.

(6) That the complaint herein be dismissed, with costs and disbursements to defendants and intervenors, and that the Court grant such other and further relief as shall be just.

November 13, 1946

/s/ JOHN VAUGHAN GRONER
/s/ ROBERT B. WHITTREDGE
Attorneys for Defendants and Intervenors
FISH, RICHARDSON & NEAVE
20 Exchange Place
New York 5, N. Y.

70 **Stipulation and Order.**

(Filed Jan. 3, 1947.)

IN THE

UNITED STATES DISTRICT COURT,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

Stipulation.

71 It is stipulated by and between the parties, by their counsel, the Court consenting thereto, that the Intervenors' Answer, filed herein on November 20, 1946, shall apply to the following additional intervenors to the same extent and with the same effect as though said additional intervenors had originally been included therein: Arthur Celona, Louis Dolgov and David Selikoff, co-partners doing business as the Modol Ring Company, having a place of business at 64 West 48th Street, New York, New York, and Skalet Manufacturing Company, Inc., a New York corporation having a place of business at 22 West 48th Street, New York, New York.

72 It is further stipulated that the attached reply of the plaintiff herein to the counterclaim of said intervenors be filed herein, and that this stipulation and said reply be considered herein as though filed as of November 25, 1946.

JOHN N. COOPER
Counsel for Plaintiff
JOHN VAUGHAN GRONER
Counsel for Defendants

So Ordered:

SIMON H. RIFKIND
United States District Judge

Date: Jan. 2, 1947

Reply to Answer of Intervenors.

(Filed Jan. 3, 1947.)

IN THE

UNITED STATES DISTRICT COURT,

FOR THE SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

Reply.

Reply of plaintiff to the Counterclaim of intervenors:

1. Plaintiff, for answer to paragraph numbered 16 of the counterclaim, admits there is an actual controversy between plaintiff and each of the intervenors and that plaintiff has asserted and claimed, and now asserts and claims, that intervenors have infringed the patent in suit; and plaintiff further admits that intervenors have contended and asserted, and now contend and assert, that no rights of plaintiff under said patent have been or now are violated by any of the intervenors, and that plaintiff has no rights against intervenors or any of them thereunder; but plaintiff denies each and every of the other allegations contained in said paragraph 16 and re-asserts, repeats and incorporates here by reference the entire complaint against the intervenors as if here specifically repeated.

VICTOR D. WERNER
19 Rector Street,
New York 6, N. Y.
Attorney for Plaintiff.

DRURY W. COOPER
JOHN N. COOPER
KARL W. FLOCKS
Of Counsel for Plaintiff

76 **Opinion.**

(Filed Feb. 7, 1947.)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

Appearances:

Drury W. Cooper, Esq., John N. Cooper, Esq., Karl W.
77 Flocks, Esq., Attorneys for Plaintiff.

Fish, Richardson & Neave, Esqs., Attorneys for Defendants; John Vaughan Groner, Esq., Robert B. Whittredge, Esq., of counsel.

RIFKIND, D. J.:

In this patent infringement suit plaintiff seeks judgment for damages, profits and injunctive relief. The answers put in issue both validity and infringement and contain counterclaims for declaratory judgment adjudicating the validity of the patent.

The patent in suit is No. 2,118,468 issued to plaintiff on May 24, 1938, on an application filed September 28,
78 1934. It contains six claims of which the first five relate to a method of casting articles of jewelry of intricate design, and the sixth is for an article of jewelry produced by the method.

Claim 2 reads as follows:

> "2. A method of casting articles of jewelry of intricate design consisting in, first making a model of the article desired to be cast, then forming a primary mould in separable sections there-around of plastic material capable of assuming intimate contact with the intricate designs of the model and adapted to retain the assumed shape, then removing

the model, then by centrifugal force projecting into the mould cavity and completely filling same a molten material of a low fusing point which will not injure the mould, then removing the fusible pattern so cast, then investing said pattern in a refractory material which will assume all the contours of its intricate design to form a secondary mould, then heat treating said investment removing the low fusing pattern therefrom, then by centrifugal force projecting molten metal into the heat treated mould, and finally removing said mould from the cast article." 80

Claims 1, 3, 4 and 5 describe variants of the method. Claim 6 reads as follows:

"6. An article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions made by a process comprising first producing a model of the article to be cast, then forming about said model a primary mould, then removing the model from the primary mould, then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould, 81 molten wax or other material of low fusing point that will not injure the primary mould to form a a pattern, and employing the pattern so made for the manufacture of a casting mould."

In the specifications the object and the several steps of the process are thus described:

"The principal object of this invention is to facilitate the casting of small metal articles, particularly articles of intricate detail such as jewelry which frequently are designed with hollows, undercut portions and perforations, so that they will have a smooth clean surface faithful in detail to the

original and free from imperfections or holes, and to enable such result being accomplished with the minimum of expense.

"A further object of the invention is to enable the formation of intricate castings which will so closely resemble the original and finished product that the slow and tedious work of patterning and detail cutting required in connection with present casting methods is eliminated."

The steps in the process are these:

83 1. A model of the article to be cast is made of wood, metal or other suitable material.

2. This model is placed upon a base and a flexible mould-forming material such as rubber, is built up around the model and vulcanized. The mould is then separated into half sections.

3. After removing the model from the mould, the two half sections are brought together again and a suitable quantity of a very low temperature fusing material which may be wax or a metallic alloy such as Wood's metal, is poured into the gate of the mould and the mould is ro-
84 tated rapidly in a centrifugal casting machine. The wax is thus forced into the cavity of the mould.

4. The wax pattern thus produced is removed from the mould by separating the half sections of the mould. It is then invested in plaster of paris which will form a suitable mould for the metal which it is ultimately desired to form to that shape.

5. The investing material may be dried out in any suitable manner but in any event the mould created by the plaster of paris is subjected to sufficient heat to melt the wax and all traces of this wax are completely removed from the mould.

6. The cavity within the plaster mould conforms to the wax pattern. The mould (investment) is then placed in a centrifugal casting machine and the molten metal from which the casting is to be made is poured into this mould and is projected by the applied force of the centrifugal action into the fine recesses. The mould is then broken up and the metal replica of the original model is abstracted.

The process thus described is a refinement of the ancient "cire perdue" or the "lost wax" process. In brief it calls for two castings for the production of a metal replica of a model. First, a wax casting is produced which 86
in turn is used to form a mould suitable for metal casting; second, a metal casting is formed with the aid of the final mould.

There is no dispute concerning the methods pursued by the defendants and intervenors in the manufacture of rings. All use the several steps of the process with the following variations: For the primary mould some use soft metal moulds as well as rubber moulds. To inject the wax into the primary mould all use a centrifuge and some also use an eye dropper or syringe, air gun, air injection machine, hydraulic machine and vacuum casting machine. All have produced and sold articles of 87
jewelry made by the process. At least to the extent that defendants have used centrifugal force to deposit the wax into a primary rubber mould, and all have, there can be no question that they have infringed.[1]

The issue of validity is thus reached immediately.

At or about the time the plaintiff contrived his process, December, 1933, the jewelry manufacturing industry generally used one of four methods for the fabrication of rings.[2]

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[1]So much defendants concede. They deny, however, any infringement in the use of metal moulds and in the use of any means other than centrifugal force for the injection of the wax into the primary mould.

[2]The evidence was substantially all addressed to the formation of rings although the patent is not so limited.

88 *Opinion*

1. Handcraft by skilled artisans.

2. Cuttlefish casting, which consists of compressing the model of the ring to be reproduced between two loaves of cuttlefish bone. The yielding surfaces of the bone form a cavity roughly corresponding to the form of the compressed model. A channel or opening between the two loaves permits the molten gold to flow into this cavity, to form a rough replica of the model. This casting is then hand-finished.

3. Sand casting, which consists of imbedding the model
89 in a sand frame which, upon the removal of the model, leaves a cavity into which the molten metal is admitted by an opening provided for the purpose. Its advantage over cuttlefish casting is that it permits the production of six to twelve castings from a single mould. The casting is rough and requires hand finishing.

4. Die stamping, which consists of stamping out the ring or parts of it by means of metal dies. This process is very efficient. It is still in extensive use when numerous castings of a single design are desired. Its initial cost is high. The dies for a single ring-design cost from $250 to $2,000.

90 Today cuttlefish casting and sand casting are of little commercial significance. Die stamping and the "lost wax" process are pre-eminent in the production of rings.

The evidence clearly supports a finding that, after Jungersen, the lost wax process as refined by him has been extensively employed in the manufacture of rings; and I shall therefore attribute to the patent "commercial success."

This, however, does not foreclose consideration of the issue of invention; nor does it render dispensable inspection of the prior art. Defendants rely upon seven items to prove that the patented process is old. In chronological order these are:

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1. The Treatises of Benvenuta Cellini, 16th Century.
2. Haseltine, British Patent No. 2467, issued 1875.
3. Spencer, U. S. Patent No. 748,996, issued 1904.
4. Kralund, U. S. Patent No. 1,228,789, issued 1917.
5. La Gravure, Publication, 1926.
6. Slatis-Dee, use and sale of product, 1931.
7. Austenal, use, 1932.

Cellini describes in minute detail the "cire perdue" or 92
lost wax process as applied to the casting in bronze of figures of life size or under. The features which distinguish it from the patented process are that Cellini does not use a rubber mould but one made of "Gesso," that is, plaster of paris or gypsum; he pours his wax, apparently employing no force but gravity to fill his mould; and when the wax is melted out, he allows the molten bronze to flow into its place, again without the use of pressure. Plaintiff, of course, calls attention especially to Cellini's method of pouring the wax as differentiating it from the patented process. He also argues that Cellini's method was available only to the artist and not to the artisan because Cellini suggests that after the wax form has 93
been prepared, "if you are minded to add any subtle labour or fancy to your work, you are easily able to do it." This last suggestion, however, does not diminish the value of the disclosure to those who are not minded to add "any subtle labour or fancy." Finally, plaintiff argues that Cellini's publication is not part of the relevant prior art because it pertains to the non-analogous sculptural art. Consideration of this point is deferred since it is also addressed to some other prior art citations.

Haseltine's invention has as its object the production of a metal-casting which is a perfect copy of its model. He teaches the making of a thin rubber mould about the

94 *Opinion*

model, into which mould, when freed from the model, he pours melted wax. To help the thin rubber retain its shape, he suggests its suspension in water. The wax model is invested with clay, after which the wax is melted out of the clay mould. He suggests that ordinary pouring of the metal into the clay mould will not give clear definition of lines and therefore recommends that the metal be poured through a pipe from a sufficient height so as to produce the required pressure. Illustratively he speaks of a statuette and in his drawing he shows a vase.

95 Spencer's patent is for a flexible mould for intricate designs. Neither with respect to wax nor metal does he teach the use of force or pressure for the injection into the mould.

It should be noted that of these references only Haseltine and Spencer were before the Patent Office.

Kralund is concerned with commercial castings, especially but not exclusively, of large bulk. He teaches the use of the "cire perdue" process with the addition of pressure derived from a die casting apparatus for the introduction of the wax into the die and for the introduction of the metal into the final mould.

96 His primary mould is of metal machined to its desired shape. Plaintiff distinguishes Kralund: The disclosure is in the field of commercial casting; Kralund's purpose was to preserve expensive steel dies by using them to cast wax patterns instead of stamping the finished metal product; if the jeweler had Kralund's dies he would stamp his rings, not cast them. While it is unquestionably true that Kralund was directing his efforts toward the more exacting requirements of precision tool casting, it does not follow that his disclosures can be dismissed as inapplicable. Clearly both plaintiff and defendant agree that by 1933 metal and rubber primary moulds were interchangeable and equivalent.

La Gravure adds little to the "cire perdue" process, except that it is explicitly applied to small pieces of jewelry. It does not teach the use of pressure in the wax casting stage but does suggest the use of steam pressure in the metal casting stage.

The Slatis-Dee method is identical with Jungersen's. However, defendants agree that it did not anticipate because it was secret. (See, however, *Dow Chemical Co. v. Halliburton Co.*, 1945, 324 U. S. 320, 326.) But defendants do rely upon a ring made by Slatis in 1931 and worn for some time by Radix, president of the Dee Company, as anticipating Claim 6. A customer of the Dee Company 98 testified that he bought one cast ring which was not satisfactory. I am not inclined to give much weight to the Slatis-Dee use either as anticipation of the process or as anticipation of the product.

The Barbed Wire Patent, 1892, 143 U. S. 275, 284.

Austenal: Great reliance is laid by defendants on the Austenal prior use. During 1932-1933, the Austenal Laboratories in Chicago, developed a method of reproducing "Steele's Backings" for the dental trade. A Steele's backing is a small undercut metal rail which fits into a channel of an artificial tooth and is used to secure the tooth to the dental plate. The process employed was 99 identical with Jungersen's except for the use of an eye-dropper to squirt the wax into the rubber mould in place of a centrifugal machine. For casting the metal Austenal employed a centrifugal machine or air pressure. I read the testimony on the Austenal use[1] to show the employment of an eye-dropper or syringe for the introduction of the wax but (though a syringe is capable of generating force) not for the purpose of applying force, and without the effect of pressure. The process met with only moderate success, was used for about a year and then superseded by a superior process.

[1] The record of another trial was received by stipulation.

100 *Opinion*

Especially instructive is Jungersen's own testimony concerning his invention because it throws light on what he regarded as available art when he first undertook to make a casting of a ring. He testified that he had been a consulting engineer and manufacturer of gasoline and diesel engines and pumps. While sojourning in Canada, in 1933, he made a wager with a friend that he could take any job his friend would select out of the newspaper advertisements. He applied for employment with a jeweler who was looking for a caster in sand and offered to reproduce any model the jeweler assigned to him. He
101 received a model of a ring. On his way home he bought some patching rubber at a gasoline station. At home he prepared a wooden frame in which he vulcanized a rubber mould about the model. "I had quite a little trouble filling the mould with wax. I knew that the dentists were using wax patterns * * * and finally I fell on the idea of filling by centrifugal force * * * I made a swing out of a wired clothes-hanger that I could swing around in my hand * * * and after that * * * I went to a mechanical dentist" where he made his final casting by means of a centrifugal machine. Only later did he hear that he had done something unusual.

102 In his British application, filed September 1934, for "improvements in methods and means of casting metals" plaintiff stated,

> "In the casting of metal it is not broadly new to make an elastic mould from an original sample or model, to produce a wax or fusible pattern with the aid of the elastic mould and to remove the pattern from the latter and invest it in a final mould from which the wax or fusible pattern is subsequently melted out to permit the pouring of the metal into the mould cavity thus vacated."

Thus we have in substance the prior art available to Jungersen when he devised his process. The question is whether his teaching amounts to invention.

Before evaluating the advance made by him, note should be taken of three district court adjudications of the very patent in issue. The first is *Jungersen vs. Jenkins*, D. C. Maryland, 1939, 30 Fed. Supp. 615. The case was "*really undefended.*" The court emphasized the use of centrifugal force for the injection of both the wax and the metal, the view that the prior patents related to "non-analogous arts such as the sculptors' art and the dental and foundry arts," and commercial success. The court found all 104
claims of the patent valid.

The second is *Jungersen vs. Morris Kaysen Co.*, E. D. Pa., 1940, 31 Fed. Supp. 703. The court found all claims valid. It emphasized the novelty of the use of centrifugal or similar force for the introduction of the wax into the primary mould and the commercial success of the process. It relied on *Bristol vs. Otis Elevator Co.*, C. C. A. 3, 1931, 52 Fed. 2d 772, 773, which held:

> "To anticipate a combination, the combination in its entirety must be old."

The last of the cases is *Ostby & Barton Co. vs. Jungersen*, D. C. N. J., 1946, 65 Fed. Supp. 652. Plaintiff sought 105
a declaratory judgment of invalidity and non-infringement. The court found that the patent described a combination of old elements to which a new one had been added, to wit, the use of centrifugal force for the injection of the wax into the primary mould. Relying upon *Textile Machine Works vs. Louis Hirsch Textile Machines, Inc.*, 1938, 302 U. S. 490, 497, it held that in order to validate the patent the addition must be the result of invention rather than the mere exercise of the skill of the calling. It found such invention. The prior knowledge, it said, was in the field of "non-analogous casting

106 *Opinion*

arts. The end results required in those arts were dissimilar to those in the jewelry art." It held that, if there were any doubt, it was dissipated by the commercial success of the process. The court found claims 1 to 4 valid. However, it found claims 5 and 6 invalid and cited the Kralund patent as an anticipation, although Kralund addressed himself to commercial castings. Claims 5 and 6 do not specify the use of centrifugal force. Claim 5 speaks only of introducing the wax into a primary mould by "force sufficient to deposit the material" and not injure the primary mould. Kralund, too, had taught making
107 the wax pattern by "forcing molten material having a low fusing point into a metal mould or die under sufficient pressure to insure the filling of said mold or die."

The novel feature of the Jungersen process relates to the casting of the primary pattern in wax or other fusible material. He injects the wax into the primary mould by centrifugal force. Does that constitute invention? Clearly the use of force for casting the metal is old; Haseltine, La Gravure, and Kralund taught it. The need of force for casting the wax was taught by Kralund who used a die-casting machine. Moreover, by his claim of infringement plaintiff practically concedes the equivalence of the
108 several modes for the application of force, namely, syringes, air pressure and centrifugal machines. The centrifugal casting machine was described in U. S. patent No. 1,457,040, issued to McManus in 1923, and was expressly stated to be suitable for the casting of jewelry such as rings "where moulds may be used to be filled by centrifugal casting methods."

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*In the Ostby & Barton case there was no claim and no finding of infringement of claims 1 to 4. Query whether weight is to be given to the finding of validity of these claims in view of *Corer v. Schwartz*, C. C. A. 2, 1942, 133 Fed. 2d 541, 544, cert. den. 319 U. S. 748, reh. den. 319 U. S. 785; *Addressograph-Multigraph Corp. v. Cooper*, C. C. A. 2, 1946, 156 Fed. 2d 483, 485; *Brunswick-Balke-Collender Co. v. American Bowling & Billiard Corp.*, C. C. A. 2, 1945, 150 Fed. 2d 69, 70, cert. den. 326 U. S. 757; *Sinclair & Carroll Co., Inc., v. Interchemical Corp.*, 1945, 325 U. S. 327, 330.

In brief, the lost wax process is very old.[5] The use of force, including centrifugal force, in filling the final mould is old. If the general casting art is the critical art for the patent in issue, I would have no hesitation in holding that the substitution of centrifugal force for other means of casting the wax is not invention, but the application of an equivalent means.

Once the use of force for the introduction of the wax into the mould was known to be desirable—and Kralund showed it—the choice of alternative means for the application of force became a non-inventive application of the skill of the caster's art. To put it simply, in the casting art it was old knowledge that the forced introduction of molten material into a mould produced greater definition of line and contour and greater fidelity of reproduction. McManus' patent showed the use of a centrifugal machine as the source of force for such purpose, which lent itself especially to small castings. Were it at that time desired to make faithful wax castings, as the final article of manufacture, it would not amount to invention to introduce the wax into the mould by centrifugal force. I fail to see why it rises to the level of invention when casting the wax pattern is an intermediate step in a longer process.

It is argued, however, that jewelry casting is non-analogous to the prior art. This argument cannot carry much weight. The art of photography has been held to be analogous to the art of blueprinting.

Elliott & Co. v. Youngstown Car Mfg. Co., C. C. A. 3, 1910, 181 Fed. 345.

[5] A brochure published by Banco de la Republica, Bogota, Colombia, 1944, shows ancient gold statuettes, of native origin, attributed to the "lost wax" process.

Pal Kelemen, Medieval American Art (The MacMillan Co., New York, 1944), Vol. I, p. 241: "The *cire perdue*, or 'lost wax,' process of casting was widely employed [by the Peruvian goldsmiths around the 10th century]. This method was essentially the same as that used for our bronzes today. It was known also in ancient Egypt and the Near East, then apparently lost to Europe in the first centuries of Christianity to be re-invented for the Renaissance shortly before Benvenuto Cellini. The perfection of this process in pre-Columbian America serves as a striking example of parallel development, when similar conditions produce similar results."

112 *Opinion*

Clay cutting has been held analogous to dough cutting.

J. H. Day Co. v. Mountain City Co., C. C. A. 6, 1920, 264 Fed. 963.

The woodworking art and metal working art have been held analogous.

Ball & Roller Bearing Co. v. Sanford Mfg. Co., D. C. Conn., 1922, 280 Fed. 415, rev., C. C. A. 2, 1924, 297 Fed. 163, but see p. 165.

See,

113 *Walker on Patents*, Deller's Ed., 1937, p. 226.

In the light of such precedents it is hard to justify a view that the casting of vases, statuettes, and small precision parts for tools is not analogous to the casting of rings. Perhaps such a view could be maintained if the casting art were transferred to a purpose never associated with a casting, such as, if rings had never been made by the casting process. But casting of rings by cuttlefish or sand mould is old art.

The evidence does not justify a finding that there is a distinct jeweler's art. The only substantial evidence on the subject was that the casting of jewelry was part of
114 the casting art. *A priori*, I should suppose that when a jeweler engraves a ring, he employs the engraver's art, when he casts a ring, he employs the casting art. All that has been established is that jewelers did not use the "lost wax" method of casting. That tradition, habit and lack of economic pressure in the manufacture of a relatively costly article combine to close the eyes of a trade to available improvement does not elevate the adoption of the improvement to the rank of invention.

Moreover, it is clear beyond peradventure that Jungersen did not believe himself engaged in a non-analogous art. The opening paragraph of the patent, which has

already been quoted, is quite instructive on that. Jungersen addresses himself to the casting of small metal articles:

> "In carrying this invention into effect the designer of a piece of jewelry or any *small article to be cast*";

also, the following,

> "It will be understood that this process is particularly applicable to the casting of precious metals, but it will also be understood that various 116
> other metals may be handled in the same way and particularly, base metals of tin and similar alloys."

The caption of the patent is

> "Method of casting articles of intricate design and a product thereof,"

clearly bringing it within the casting art. Cellini was undoubtedly a sculptor, but I doubt the jewelers would have regarded him as an intruder in their midst.[6]

The conclusion I reach is that the claims are all invalid because anticipated and for want of invention. Claim 6 is also invalid because it describes an old article in terms 117
of a process of manufacture.

Cochrane v. Badische Anilin & Soda Fabrik, 1884, 111 U. S. 293, 311;
Pfanstiehl Chemical Co. v. American Platinum Works, C. C. A. 3, 1943, 135 Fed. 2d 171, 173.

Dated, New York, N. Y., February 7, 1947.

SIMON H. RIFKIND
U. S. D. J.

[6] Cellini's first apprenticeship was to a goldsmith. At Rome he was employed on jewelry. Is his celebrated saltcellar in the sculptor's or the jeweler's art?

118 Letter

FISH, RICHARDSON & NEAVE

20 Exchange Place, New York, N. Y.

COPY

February 12th, 1947

Honorable Simon H. Rifkind
United States District Court
For the Southern District of New York
Foley Square
119 New York, New York

Re: Jungersen v. Baden & Foss
Civil Action No. 24-221

My dear Judge Rifkind:

In studying the opinion in the above matter, I have noticed one case, and possibly two, where it seems probable to me there is a misuse of terms. If I am correct in this assumption, you may want to make changes.

In the second line of page 15 of the typed opinion (page 12 of the printed opinion enclosed herewith, as marked) [page 36, line 22, supra] is the statement:

120 "The need of force for casting the wax was taught by Kralund who used a die stamping machine."

Kralund used a die casting machine (R., p. 418a, ll. 55-56, 60-61, 77-78, 85; p. 415a, ll. 59-61, 72-80).

It is unfortunate that the word "die" is used in conjunction with both die stamping and die casting, since the meaning in the two cases is entirely different. As Kralund shows, the die of the die casting art is a mould (R., p. 414a, ll. 75-85, 88; 415a, ll. 18-23, 51-80, 84-85; see also, Dictionary of Technical Terms, Bruce, 1942, and Chambers' Technical Terms, MacMillan, 1940.

121

In contradistinction to this, the die of die stamping is merely an engraved block forced down upon thin and softer metal to make an impression therein, or thereon. Chambers defines it as follows:

> "(1) A metal block used in stamping operations. It is pressed down on to a blank of sheet-metal, on which the pattern or contour of the die surface is reproduced."

The other occurrence, which concerns the same words but about which I am more doubtful, is found in the 19th line of page 6 of the typed opinion (page 6 of the printed Opinion, as indicated) [page 30, line 24, supra], and is as follows:

122

> "Die casting and the 'lost wax' process are pre-eminent in the production of rings."

Was not "die stamping" intended in place of "die casting"?

I am, of course, sending a copy of this letter to Mr. Cooper.

Respectfully,

123

JVG/hb

124 *Letter*

Copy

UNITED STATES DISTRICT COURT
JUDGE RIFKIND'S CHAMBERS
United States Courthouse
Foley Square
New York

Feb. 14th 1947

Messrs. Fish, Richardson & Neave,
125 20 Exchange Place,
New York, 5, N. Y.

Atten: John Vaughan Groner, Esq.

Dear Mr. Groner:

Re: Jungersen v. Baden

Thank you for your letter of February 12th. Very glad you called the errors to my attention. I have corrected them upon the opinion filed.

Very truly yours,

(Sgd) S. H. RIFKIND

126 CC to Mr. Cooper

Findings of Fact and Conclusions of Law.

127

(Filed Apr. 5, 1947)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

This cause having been tried to the court without a jury the court finds the facts and states its conclusions of law, as follows:

128

Findings of Fact

1. This is an action for patent infringement, brought by plaintiff, the owner of Jungersen Patent No. 2,118,468, against defendants, a partnership, resident and doing business in the City of New York, in the Southern District of New York. Seven corporations and fifteen individuals, comprising six partnerships, have intervened and are parties defendants herein.

2. The Jungersen patent No. 2,118,468, applied for September 28, 1934 and issued May 24, 1938, contains six claims. The specification of the Jungersen patent is 129 addressed to a method of casting of small metal articles, particularly articles of intricate detail and the steps in the process of the Jungersen patent are as follows:

a. A model of the article to be cast is made of wood, metal or other suitable material.

b. This model is placed upon a base and a flexible mould forming material such as rubber, is built up around the model and vulcanized. The mould is then separated into half sections.

130 *Findings of Fact and Conclusions of Law.*

c. After removing the model from the mould, the two half sections are brought together again and a suitable quantity of a very low temperature fusing material which may be wax or a metallic alloy such as Wood's metal, is poured into the gate of the mould and the mould is rotated rapidly in a centrifugal casting machine. The wax is thus forced into the cavity of the mould.

d. The wax pattern thus produced is removed from the mould by separating the half sections of
131 the mould. It is then invested in plaster of Paris which will form a suitable mould for the metal which it is ultimately desired to form to that shape.

e. The investing material may be dried out in any suitable manner but in any event the mould created by the plaster of Paris is subjected to sufficient heat to melt the wax and all traces of this wax are completely removed from the mould.

f. The cavity within the plaster mould conforms to the wax pattern. The mould (investment) is then placed in a centrifugal casting machine and the molten metal from which the casting is to be
132 made is poured into this mould and is projected by the applied force of the centrifugal action into the fine recesses. The mould is then broken up and the metal replica of the original model is abstracted.

3. All the defendants use the several steps of the process with the following variations:

a. For the primary mould some use soft metal moulds as well as rubber moulds. The metal moulds so used are made of a very soft metal which has a melting point of about 200° F. and this primary mould is built up of a number of parts by flowing this soft low fusing metal over the exposed por-

tion of the model so as to take the shape of the mould in negative; and this soft metal mould is not machined.

b. To inject the wax into the primary mould all use a centrifuge and some also use an eye dropper or syringe, air gun, air injection machine, hydraulic machine and vacuum casting machine.

In view of the findings and conclusions as to validity, no finding is made as to whether or not these variant methods are infringements. To the extent that defendants have used centrifugal force to deposit the wax into a 134
primary mould, and all have, there can be no question that they have infringed.

4. At the time plaintiff conceived his process in December, 1933, the jewelry manufacturing industry, including these defendants, generally used one or more of the following four methods: Hand-fashioning by skilled artisans; cuttle-fish casting, which necessitated hand-finishing the rough casting by skilled jewelry mechanics; sand casting, which also required hand-finishing by skilled jewelry mechanics; and die stamping, which is efficient when numerous rings of a similar design are desired but which has a high initial cost, the dies for the single ring design 135
costing from $250.00 to $2,000.00.

5. Since the introduction into the jewelry trade of the Jungersen process, cuttlefish casting and sand casting are of little commercial significance. Die stamping and the process of the Jungersen patent are the only substantial methods now commercially used in the production of jewelry. His process, as described and claimed in the patent in suit, has been extensively employed in the manufacture of jewelry and is entitled to the attribute of commercial success.

136 *Findings of Fact and Conclusions of Law*

6. The process of the patent in suit makes possible the manufacture of a few rings, or a hundred rings, more economically than by stamping processes. The size of the casting, the intricacy of the casting, and the material of which it must be cast, are the controlling factors.

7. The following prior patents and prior publications are relevant to the prior art: Spencer No. 748,996 of 1904; Haseltine (British) No. 2467 of 1875; Kralund No. 1,238,789 of 1917; "The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture" from the 16th Century;
137 "La Gravure," by Verleye, received in the United States on or before September 11, 1926. This also is true of the prior public use of the Austenal Laboratory in New York and Chicago in 1932-1933.

8. Cellini describes in minute detail the "cire perdue" or lost wax process as applied to the casting in bronze of figures of life size or under. The features which distinguish it from the patented process are that Cellini does not use a rubber mould but one made of "Gesso," that is, plaster of Paris or gypsum; he pours his wax, apparently employing no force but gravity to fill his mould; and when the wax is melted out, he allows the molten bronze to flow into its place, again without the use of pressure.
138

9. Haseltine's invention has as its object the production of a metal casting which is a perfect copy of its model. He teaches the making of a thin rubber mould about the model, into which mould, when freed from the model, he pours melted wax. To help the thin rubber retain its shape, he suggests its suspension in water. The wax model is invested with clay, after which the wax is melted out of the clay mould. He suggests that ordinary pouring of the metal into the clay mould will not give clear definition of lines and therefore recommends that the metal be poured through a pipe from a sufficient height so as

to produce the required pressure. Illustratively he speaks of a statuette and in his drawing he shows a vase.

10. Spencer's patent is primarily concerned with the making of a flexible mould for intricate designs. Neither with respect to wax nor metal does he teach the use of force or pressure for the injection into the mould.

11. Kralund is concerned with commercial castings, especially but not exclusively, of large bulk. He teaches the use of the "cire perdue" process with the addition of pressure derived from a die casting apparatus for the introduction of the wax into the die and for the introduction of the metal into the final mould. His primary mould is of metal machined to its desired shape. Kralund was directing his efforts toward the requirements of precision tool castings which are more exacting than those of jewelry casting. 140

12. La Gravure adds little to the "cire perdue" process, except that it is explicitly applied to small pieces of jewelry. It does not teach the use of pressure in the wax casting stage but does suggest the use of steam pressure in the metal casting stage.

13. During 1932-1933, the Austenal Laboratories in Chicago, developed a method of reproducing "Steele's Backings" for the dental trade. A Steele's Backing is a small undercut metal rail which fits into a channel of an artifical tooth and is used to secure the tooth to the dental plate. The process employed was identical with Jungersen's except for the use of an eye dropper to squirt the wax into the rubber mould in place of a centrifugal machine. For casting the metal Austenal employed a centrifugal machine or air pressure. I read the testimony on the Austenal use to show the employment of an eye dropper or syringe for the introduction of the wax but (though a syringe is capable of generating force) 141

142 *Findings of Fact and Conclusions of Law*

not for the purpose of applying force, and without the effect of pressure. The process met with only moderate success, was used for about a year and then superseded by a superior process.

14. Of the above references only Haseltine and Spencer were before the Patent Office.

15. Jungersen's British patent, the substantial equivalent of the patent in suit, admits that every step in the process of the patent in suit except the means of casting the wax and the metal was old.

143

16. The Slatis-Dee method purports to be identical with Jungersen's. However, defendants agree that it does not anticipate because secret and the Slatis-Dee use is not an anticipation of the Jungersen process or his product.

17. Jungersen's testimony concerning his invention shows that his work, which resulted in the patent in suit, was undertaken on a bet and employed known materials and appliances to accomplish known and expected results, and only later did he hear that he had done something which was thought to be unusual.

144 18. By 1933 metal and rubber primary moulds were interchangeable and equivalent.

19. The use of force for casting metal is old; Haseltine, La Gravure and Kralund taught it. The need of force for casting wax was taught by Kralund who used a die casting machine. Plaintiff practically concedes the equivalence of the several modes for the application of force—namely, syringes, air pressure and centrifugal machines. The substitution of centrifugal force for other means of casting the wax is not invention, but the application of an equivalent means.

Findings of Fact and Conclusions of Law 145

20. Once the use of force for the introduction of the wax into the mould was known to be desirable—and Kralund showed it—the choice of alternative means for the application of force became a non-inventive application of the skill of the caster's art.

21. In the casting art it was old knowledge that the forced introduction of molten material into a mould produced greater definition of line and contour and greater fidelity of reproduction. McManus' patent showed the use of a centrifugal machine as the source of force for such purpose, which lent itself especially to small casting, specifically including jewelry. Were it at that time desired to make faithful wax castings, as the final article of manufacture, it would not amount to invention to introduce the wax into the mould by centrifugal force. Nor does it amount to invention when casting the wax pattern is an intermediate step in a longer process. 146

22. The evidence does not justify a finding that there is a distinct jeweler's art. The only substantial evidence on the subject was that the casting of jewelry was part of the casting art. The casting of vases, statuettes and small precision parts for tools is analogous to the casting of rings. 147

23. The specification of the patent in suit is not limited to jewelry casting and by its specific terms is brought within the casting art.

24. Claim 6 of the patent in suit describes an old article in terms of a process of manufacture.

Conclusions of Law.

1. All of the claims of the patent in suit are invalid because anticipated and for want of invention.

148 *Findings of Fact and Conclusions of Law.*

2. Claim 6 of the patent in suit is also invalid because it describes an old article in terms of a process of manufacture.

3. A judgment may be entered in defendant's favor adjudging all of said claims invalid and void, enjoining plaintiff or anyone in privity with him from bringing or prosecuting or threatening to bring or prosecute any civil action charging infringement of said patent No. 2,118,468, or any claim or claims thereof against the defendants, or any of them, or their agents, vendees or
149 others in privity with them, or any of them, and awarding defendants their costs to be taxed against plaintiff.

Dated, New York, N. Y., April 4th, 1947.

SIMON H. RIFKIND
U. S. D. J.

150

Final Judgment. 151

(Filed Apr. 23, 1947.)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

This cause having come on for trial before the Court, the parties appearing and the issues having been duly tried, and the Court having rendered its opinion and made findings of fact and conclusions of law, and the parties having 152
agreed upon the costs to be taxed therein, now, therefore, thereupon and upon consideration thereof,

It is Ordered, Adjudged and Decreed

1. That the action and the complaint herein be and the same hereby are dismissed with prejudice; and

2. That the defendants recover from plaintiff their costs and disbursements herein in the amount of $300.00 taxed against the plaintiff, and that defendants have judgment and execution therefor.

Dated: April 22nd, 1947.

153

SIMON H. RIFKIND
United States District Judge

Agreed to as to form:

DRURY W. COOPER
Attorney for Plaintiff
JOHN VAUGHAN GRONER
Attorney for Defendants

Judgment Rendered
William V. Connell
Clerk
Apr 23 1947

Notice of Appeal.

(Filed July 17, 1947.)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

Notice is hereby given that Thoger Gronberg Jungersen, the plaintiff above-named, hereby appeals to the Circuit Court of Appeals for the Second Circuit from the final judgment rendered, entered and filed in this action on April 23, 1947.

DRURY W. COOPER
JOHN N. COOPER
Counsel for Thoger Gronberg Jungersen, Plaintiff-Appellant,
233 Broadway,
New York 7, N. Y.

To:

Fish, Richardson & Neave, Esqs.,
Attorneys for Defendants and Intervenors,
20 Exchange Place,
New York 5, N. Y.

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

Before: HON. SIMON H. RIFKIND, District Judge.

New York, November 25, 1946;
11o'clock, A. M.

Appearances:

158

Victor Davis Werner, Esq., Attorney for the plaintiff; Drury W. Cooper, Esq., John N. Cooper, Esq., and Karl W. Flocks, Esq., of Counsel.

Fish, Richardson & Neave, Esqrs., Attorneys for the defendants; John Vaughan Groner, Esq., and Robert B. Whittredge, Esq., of Counsel.

Mr. J. Cooper: I offer in evidence, your Honor, a soft copy of the Jungersen patent in suit, No. 2,118,468, as Plaintiff's Exhibit 1

(Marked Plaintiff's Exhibit 1.)

Mr. J. Cooper: I offer in evidence as Plaintiff's Exhibit 2 a paper entitled "Defendants' Objections and Answers to Plaintiff's Interrogatories."

159

(Marked Plaintiff's Exhibit 2.)

Mr. D. Cooper: Mr. Shaw.

GEORGE SHAW, called as a witness on behalf of the plaintiff, being duly sworn, testified as follows:

Direct Examination by Mr. D. Cooper:

Q. Mr. Shaw, where do you live? A. In Toronto, Canada.

Mr. D. Cooper: Your Honor has a copy of the patent, I think, as an addendum to my brief.

The Court: Yes.

Q. How long have you lived there? A. Over 20 years.

Q. And what has your business been in Toronto? A. Manufacturing jewelry.

Q. That has been your life work? A. Yes.

Q. Have you your own business? A. That is correct.

Q. How long have you had your own business? A. 13 years.

Q. And before that you worked at the same trade for others? A. Yes.

Q. What is the name of your present firm? A. Libman & Shaw.

161 Q. And where are they located in Toronto? A. 12 Queen Street East.

Q. Now give me some idea of the size of your firm, please, Mr. Shaw? A. In Canada, in our type of manufacture, which is principally diamond jewelry rings, we would be considered one of the larger manufacturers.

Q. And has that been true during all your connection with it? A. Well, we started in a small way.

Q. And grew up to be a large firm? A. Yes.

Q. Do you know a man named Goldsmith in Canada? A. I know the Goldsmith Company in Canada.

Q. And as I understand it, you took a license from
162 Goldsmith or his company under the Jungersen casting process patent in Canada? A. That is correct.

Q. When did you take that license? A. We obtained the license late in the year 1935.

Q. What were you empowered to do under the license? A. To cast jewelry by the method taught as the Jungersen process by the Goldsmith Company.

Q. Will you describe it, please? A. We first of all make a model giving the model every detail and every opportunity for reproduction of everything possible in a model.

The Court: Of what material?

The Witness: It can be any material, a base metal material, a copper or silver alloy. Around the model we fashion a rubber mold.

Q. How do you do that? Describe that to the Court. A. We have what we call a frame, and in this frame we put plaster. We set the model in the plaster when the plaster is in a fluid state to determine the best possible split line—

Q. That is a split line for the two parts of the mold? A. That is correct.

Q. Yes? A. We then proceed to vulcanize on that frame. We remove the vulcanized section and re-vulcanize on the other half.

Q. That is, you put in rubber? A. That is correct.

Q. In that plaster frame? A. Yes.

Q. And then vulcanize that about the pattern? A. Model. 164

By the Court:

Q. You have a frame? A. That is correct.

Q. In which you have a liquid plaster fluid? A. Yes.

Q. Now then you take the model, a metal model which you have fashioned in some form or another, probably by hand? A. By hand, yes.

Q. And you set that in that fluid mixture? A. Right.

Q. And I suppose it hardens? A. It hardens.

Q. The plaster hardens. Now what do you do from that point on? That is where I lost track. So far I know you have got a plaster mixture in which is imbedded this metal object. A. We apply a further frame, your Honor, or a retaining frame, and we apply the rubber in that frame and vulcanize that. 165

Q. You are assuming that I have seen your process. Now start with the point where you have got this mass of plaster with a hard object in it. Now what do you do? Open it up? A. Well, I will try to elaborate. I suppose a person is prone, with something they are very familiar with, not to go into too great detail. Perhaps if you could watch my hands—

Q. All right, I will watch your hands. A. We have a flat frame in which we have plaster in a fluid state. We have prepared the model. We place the model into the fluid plas-

166 *Plaintiff's Witness, George Shaw, Direct*

ter, determining the split-line—that is to say, where the mold will part.

Q. All right. A. We then permit, of course, the plaster to solidify. We apply a further frame—

Q. What does that mean? A. Principally a picture frame style of frame. Really a frame.

Q. You set that on the plaster? A. Yes, over the plaster. Then we apply the rubber.

Q. You pour rubber over this thing? A. You apply layers of rubber.

167 Q. You apply layers of rubber over the surface of this plaster? A. Yes.

Q. Sheets of rubber? A. Yes. It comes in sheet form.

Q. You lay that right over the plaster? A. Yes, cut in the exact shape.

Q. As the plaster? A. Well, with sufficient overflow. That is something, of course, that is determined by experience. We then vulcanize that or cure it.

By Mr. D. Cooper:

Q. Now what is the effect of the vulcanization on the rubber? A. Well, rubber under the vulcanizing becomes fluid and penetrates into the design and takes the form of

168 the model.

By the Court:

Q. The rubber becomes fluid and penetrates into the plaster? A. No, into the surrounding model. It surrounds the model, the exposed surface of the model. It does not penetrate the plaster.

Q. I see. The model is not entirely buried in the plaster? A. Just half.

Q. Half of it is above the surface? A. Yes.

Q. And thus rubber forms the top half of it? A. Yes.

Q. All right. A. The frame is then removed, prepared, and another frame applied, applied the opposite way, and

the rubber is then applied and revulcanized. In other words it is vulcanized once more—

Q. Just a minute. The lower half is sitting in plaster? A. That is correct.

Q. And the top half is now sitting in rubber? A. Yes. You remove the bottom plate.

Q. You take the plaster away? A. Yes.

Q. And what do you do then? Turn it upside down? A. Yes, then you have the model surrounded—part of the model which was exposed is now surrounded by the rubber.

Q. On both sides? A. On one side.

Q. Well, when you start it is on one side? A. Yes. 170

Q. And then you turn it upside down? A. Yes.

Q. And then you proceed to vulcanize the other side? A. Yes.

Q. And you throw the plaster away? A. Yes.

Q. In other words, the plaster originally served as something to hold the thing in place? A. A retaining object, yes.

By Mr. D. Cooper:

Q. Well then, having made this rubber mold after the fashion you have described, what do you next do? A. We take the mold apart and do the necessary cutting. We have some cutting to do to release that, according to the intricacy 171 of the design.

By the Court:

Q. You split it at the point where the two sheets of rubber meet? A. Yes.

Q. And you now have two sheets each of which contains a female reproduction of one half the object which you had? A. Yes. We then centrifugally cast wax into this mold.

By Mr. D. Cooper:

Q. Wait a minute. You put the two parts together next, don't you? A. Yes. We take the mold and centrifugally

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cast wax into the mold in a regular centrifugal casting machine.

Q. Then what next? A. We remove the wax from the—

The Court: Now wait a minute. Don't go too fast.

By the Court:

Q. You put these sheets of rubber together? A. Yes, which forms our mold.

Q. And then you say you drive wax between it? A. Yes.

Q. You leave an opening to receive it? A. Yes, there is
173 an opening. That is taken care of in the setup. I could go into much greater detail—

Q. No. Through that opening— A. We centrifugally cast wax.

Q. —you cast wax into it? A. Yes.

By Mr. D. Cooper:

Q. Is this one of the rubber molds that you have used in your manufacture (indicating)? A. That is correct.

Mr. D. Cooper: You might show that to the Court.

By the Court:

Q. Are these intended to fit over each other? A. That is
174 correct. The lines and points are merely to give binding action so there is no parting or distortion under the centrifugal action.

Mr. D. Cooper: I will offer in evidence this model. (Marked Plaintiff's Exhibit 3.)

By Mr. D. Cooper:

Q. Now, this model has at one end a pouring hole, whatever you call it? A. A sprue hole.

Q. Then you take that mold, and you said something about forcing something into there? A. Yes, we centrifugally cast wax into the mold. I do not know whether you understand the common centrifugal machine or not, your Honor.

175

By the Court:

Q. I suppose it is a machine that whirls around? A. It was commonly used in the dental trade for a great many years.

Q. Anyway, the effect of it is to push wax into the sprue hole? A. Yes.

By Mr. D. Cooper:

Q. And what is the effect of that forced introduction of the wax? A. The wax completely fills the cavity, giving an exact replica of the model around which the mold has been vulcanized.

176

Q. Then what do you do next in your process? A. We remove the wax.

Q. From the mold? A. From the mold.

By the Court:

Q. The wax hardens? A. Yes.

Q. Naturally? A. It hardens fairly rapidly, yes.

Q. And then just peels out of the mold? A. Yes.

By Mr. D. Cooper:

Q. Now then, what next do you do with the wax replica? A. We take the wax replica, or we can take numerous wax replicas—we do not work one at a time—

177

Q. Take one. A. We take one wax replica and we put it in a sprue form or holder.

Q. What does that mean? A. It just really means that it holds the wax in the proper position and forms the foot of which will be the gate opening for the metal cast.

By Mr. D. Cooper:

Q. Now how do you form this metal cast about the wax replica? A. We apply on this former a cylindrical tube. Into the cavity formed by the cylindrical tube in the holder we apply investment, liquid.

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Q. Well, the investment material is what? A. Dental investment.

Q. Is it plaster of Paris, or something of that sort? A. Yes, it is principally plaster of Paris, I understand.

Q. Then you let that plaster of Paris harden, I suppose? A. That is correct.

Q. Then what next do you do in the preparation of your ring, or whatever object or jewelry you are making? A. The rubber sprue former on the end of the tube is removed, the molds are placed in an oven and the wax
179 is eliminated.

Q. That is to say, this oven treatment hardens the investment material, I suppose? A. It dries it out and eliminates the wax at the same time.

Q. Then what do you do next? A. We remove the mold from the oven and again place it in a centrifugal casting machine and cast the desired metal or gold—

By the Court:

Q. So the whole object of this last operation is to transform your rubber mold into a plaster of Paris mold; is that right? A. Well, generally speaking we have a plaster of Paris mold with an opening exactly the same
180 as the model.

Q. What I mean is, when you have finished running the wax out of it, you then have a plaster of Paris mold which looks like the rubber mold? A. Well, I can't say, your Honor, it looks like the rubber mold.

Q. Well, it has the same design? A. Yes, the opening in the plaster of Paris is an exact replica of our orginal model.

Q. That is what I mean. The inside is exactly like the rubber? A. Yes.

Q. And what you have just done is to give you a plaster of Paris mold instead of a rubber mold? A. Yes, into which to pour metal.

181

By Mr. D. Cooper:

Q. Have you here a sample of this investment operation? A. That is correct.

Q. Well, explain that to the Court a little bit. You have done something to that plaster of Paris, I suppose? A. As I described, here is your rubber former. There is the tube and the investment, and there is a cross-section after the wax has been eliminated.

Q. That is, you have cut off part of the investment material so as to exhibit it to the Court? A. Yes.

182

By the Court:

Q. What is the function of the three little holes in the bottom of the rubber former? A. In our general practice we invest three at a time in that particular mold.

Q. You pour the stuff through those holes? A. We hold the waxes on that, three waxes on little posts, as it were, and we apply that cylindrical tube over the rubber former and then pour in our investment.

Mr. D. Cooper: So according to this particular model you make three rings at a time?

The Witness: At one cast.

183

Q. You say three rings will emerge out of this one? A. Yes.

Q. Where will the second and third ring be? A. This particular mold is set up for two.

Q. For two? A. Yes.

Q. I see one cut away. Where is the other? A. The other one is behind it. You see the other opening there (indicating)?

Q. Yes. A. The sprue former is for three. The mold has been made for two.

Q. Then you pour the precious metal, gold or whatever it may be through the opening into the plaster of

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Paris part and that takes the shape of the original model? A. Yes.

Q. And how do you get the ring out? Split it open? A. The plaster of Paris disintegrates in water and we push it out.

By Mr. D. Cooper:

Q. Now how do you get the precious metal into this mold? A. The gold is applied to the mold centrifugally as the wax.

185 Mr. Cooper: I will offer in evidence this plaster of Paris model.

(Marked Plaintiff's Exhibit 4.)

Q. When was it, about, that you took the license under Mr. Jungersen's Canadian patent? A. Late 1935.

Q. And have you practised that process since then? A. I have practised it in my plant exclusively since that time.

Q. Now what prior to that time did you do in order to make rings and other articles of small jewels? A. We used two other methods of casting, one being, the principal method, cuttlefish casting.

186 Q. Will you describe, by reference to the model that I show you, how that was done? A. This is a cuttlefish bone which is cut in half, trimmed on the edges, and a model placed on the one-half and an impression taken by compressing both halves together.

The Court: That is a real bone of a cuttlefish?

The Witness: Yes, a bone of a cuttlefish.

Q. By that pressure in the cuttlefish bone, what do you get? A. We have an impression of a model without undercut.

Q. That is to say, you have a rough impression, if I get you? A. Well, only vertical and parallel surfaces.

Q. What caused the apparent burning in this cuttlefish? A. That is the application of hot metal to the mold.

Q. What did you then have to do to the model that was so made, or to the ring that was so made? A. We removed the ring from the mold. We have a casting with a gate or feed on it, and I might say a rough casting, a comparatively rough casting of a ring, a casting that has no detail other than surface—no surface other than straight surfaces and no undercuts.

Q. What did you have to do to that ring after this operation as you have thus far described it? A. We file 188
it all over, sandpaper it and clean it and mark the desired pattern on the ring. Then we would drill the openings we had marked as our design and pierce it by hand.

The Court: Pierce what? You mean the finger opening is not in the ring?

The Witness: No; by that I refer to the design. We would have the openings on the setting.

Q. What character of labor did you employ for that purpose? A. Good, highly skilled jewelry labor.

Q. Commanding a high price? A. A good and possibly about the second highest salary we pay.

Q. Were they artists, or artisans? A. They are very 189
skilled operators, and they require a long period of training. It is a very tedious, minute detail to be pierced by hand, and they serve a considerable number of years before they become proficient at it.

Q. Now in the Jungersen process what do you have to do after the thing came out of the plaster mold? A. Well, we have an entirely different kind of casting. We have a casting that has every possible detail a person would desire in a finished object. The casting is not limited to undercuts. It is limited to no type of design whatever. You can make anything in a rubber mold.

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Q. That is it is finished? A. It is finished to a degree that requires very little cleaning to finish it. It requires no piercing, drilling or other work such as the other casting does, and no marking out of a design. The design is already there in great detail.

Q. And what does the additional labor on this Jungersen type amount to? A. The amount of labor expended on a casting of course depends to a great extent on how elaborate the piece is; the size and the design. The time for finishing would run from 15 minutes to 45 minutes.

191 Mr. Groner: Excuse me. Is that a Jungersen ring?

The Witness: On a Jungersen ring.

Q. And how about the cuttlefish? A. The cuttlefish is a proposition which would require 2 1/2, 3 1/2 hours to make anything nearly as nice an object.

Q. And the cuttlefish requires a highly skilled labor? A. Yes.

Q. And what about the Jungersen type? A. Well, the Jungersen ring is very true in form, very complete in detail and naturally requires very little skilled labor to finish.

192 Mr. Groner: The defendant does not contend at all that the cuttlefish method is comparable with this method. There is no question at all about that.

Mr. Cooper: I will offer in evidence this cuttlefish model.

(Marked Plaintiff's Exhibit 5.)

Q. You also mentioned as one of the anterior practices the sand casting, I think. What relation did that bear to the cuttlefish casting? A. For certain types of jewelry the sand casting is a much better method. In a gent's ring or signet type of ring we made sand casting. It is very similar to cuttlefish, inasmuch as you form a sand

frame. When the sand is the proper constituteney you press your metal in, you apply another half of the frame and fill in the balance of the sand, and make your opening and cast your metal.

Q. What about the product of the sand casting as compared with the product of the cuttlefish casting? A. The sand casting had one advantage over the cuttlefish, inasmuch as you got greater production from a sand mold. Cuttlefish casting is confined to one object from a mold. In a sand type of mold you could get very readily six to 12 castings from a mold.

194

Q. What did you have to do to the castings after they came out of the sand? A. Sand casting is a comparatively rough casting, and most sand castings are cast on flat; they have to be rounded and formed and sized to fit the finger. The surface is a surface comparable to a cuttlefish, requires a lot of cleaning and filing.

Q. Meaning still more labor? A. Still considerable labor.

Q. Now coming to your present use of the Jungersen process, how many castings do you make in a month, say? A. Well, of course, that varies according to the degree of production that the period requires. We run from 50, 100 a day to 3,000 castings a month.

195

Q. At the time you made the license with Goldsmith on the Jungersen patent, were there other licensees in Canada? A. To the best of my knowledge there were two other people using the method.

Q. What about the present time? What proportion of the casting of jewelry is with the Jungersen patent and what with the cuttlefish or sand? A. I do not know of any manufacture of any size that does not use this method in Canada today.

Q. Now is there still another way of making rings or other intricate articles of jewelry? A. Yes, rings can be manufactured in dies by the striking method.

196 *Plaintiff's Witness, George Shaw, Direct*

Q. That is, that requires the manufacture of a die that is an accurate reproduction of the model? A. It requires numerous types of dies, cutting dies, blanking dies and forming dies.

Q. All for the same object? A. Yes, according to the degree of design embodied in the article.

Q. And what about the expense of such dies? A. Well, those dies for a simple article can be a few hundred dollars; they can be as high as $2,000 for an expensive object.

197 Q. For a single set of dies for one object? A. That is correct.

Q. What is the expense of the Jungersen practice? A. Exclusive of the license royalty, we would form a model, and the model could vary in price, again according to the desired effect; from $25 to as high as $125.

Q. That is the original design? A. Yes, the original master model.

Q. Well, after that? A. The expense would be approximately $3.50 making a rubber mold.

Q. And the expense of the striking dies would run from $500 to what? A. In my experience $2,000. I have never made those dies.

198 Q. And with the Jungersen process, after making your original pattern, the total expense of carrying out the process is only a few dollars? A. That is correct. We figure the cost of a casting to be around ten to 15 cents.

Q. Now have you had experience in the United States with jewelers, Mr. Shaw? A. Well, I have been in New York a great many times before and after I used the Jungersen method. My experience, of course, prior to the Jungersen method here was that everything was produced either by dies—the bigger operators used dies; the smaller operators used cuttlefish or sand, as his equipment was very much less expensive and elaborate and it was much easier to start in business. The large operators principally used dies.

Q. What has happened of late years? Has what you have described as the Jungersen process been used in the United States? A. I think it is used almost by every manufacturer to the best of my knowledge.

Q. And going back to what time? A. Well, I first talked the Jungersen method in 1936.

Q. To whom did you talk it? A. To various acquaintances that I had in the trade.

Q. What about Baden & Foss? A. I talked to Mr. Baden of this method in January in 1936.

Q. What occurred in that conversation? Give the substance of it. A. Well, I was in New York on this occasion with a friend of Mr. Baden, and I might say a friend of Mr. Foss, who was at that time a salesman for Mr. Baden. Mr. Walsh had been in the habit of doing business with Mr. Baden. 200

Q. Mr. Walsh being the friend you mentioned? A. Yes; he introduced me to Mr. Baden with the object that he thought it would be beneficial for him to see what I was doing in Canada in the nature of casting rings.

Q. What was Baden using at that time? A. Well, Mr. Baden was, like many other gentlemen, when he first saw this casting he was rather at sea as to how it could be made— 201

The Court: You are not answering the question. The question was what was Baden using before you talked to him in 1936.

The Witness: Mr. Baden permitted me to go into his plant and showed me his cuttlefish method of casting, and that, as I understood, was his chief means of manufacturing.

The Court: Go ahead.

The Witness: I talked to Mr. Baden on the subject, not at great length, and we discussed it, and I believe that I had no authority to divulge anything about the method—

202 *Plaintiff's Witness, George Shaw, Direct*

Q. So you did not disclose to him? A. No. I merely showed him the objects that we had cast with the method.

Q. Now I want to ask you if you have produced here a considerable number of rings made according to the Jungersen process under your direction as samples of what can be done? A. Yes, I have them here.

Q. You have them here? A. Yes.

Q. These are all that you have produced (indicating)? A. That is correct.

Mr. D. Cooper: I offer in evidence this little box
203 containing I think about 20 or 25 rings.

The Court: Made according to the Jungersen process and under your direction?

The Witness: That is correct.

The Court: If there is no objection they will be received.

Mr. Groner: No objection.

(Marked Plaintiff's Exhibit 6.)

Q. Will you examine all these and explain to the Court the difference between the castings as they come out of the plaster mold in Jungersen's method and the ultimate finished casting by the polishing, or whatever else is done
204 to them afterwards? A. Well, the chief noticeable feature is the uniformity and correctness of reproduction.

Q. Now this particular bunch that you have here is a set of identical rings— A. From the same mold.

Q. —from the same mold? A. Waxed from the same mold.

Q. That is about six of them? A. Yes.

Q. And you say they are identical? A. That is correct. They are regular stock castings taken from my stock as I take the orders from my stock.

Q. And are those finished by the subsequent polishing, or whatever you do to them, after they come out of the

mold? A. Yes, a small bunch is made, sandpapered and polished.

Q. What about these other specimens? A. Well—

The Court: The ones I have looked at are still unpolished?

The Witness: That is right. They had no work on them. Here you have some castings that have had no work on them.

Q. This is a pair of them? A. Yes.

Q. One is polished and the other is unpolished? A. Yes. It requires 15 minutes, I might state, for that particular ring from the casting to the finished state. 206

Q. All right. And what are those? A. Those are six further castings without any work as the single cylinder type, and the others are wedding rings, and those are also the unfinished castings for different types.

Q. These six that you have here? A. Yes. Here are further castings of wedding rings which are of a different style from the previous wedding rings.

Q. Those are the six that are at the bottom of the box? A. Yes. Here you have a casting in white gold and a finish in white gold, a cluster-type ring.

Q. And the only thing that is done to the particular one here has been to polish it? A. Yes, sandpaper it and polish it. 207

Q. Sandpaper and polish it? A. That is right. I might state that in that type of ring you get a great benefit from the Jungersen method, inasmuch as to create a piece of jewelry like that previously it was a rather laborious job. It was made from numerous parts and assembled by hand and there were certain parts to cut out.

Q. And what training did you have to give to your labor that you used in the finishing of these rings by the Jungersen method? A. Well, I had a rather unique experience in this last year on that particular question.

208 *Plaintiff's Witness, George Shaw, Direct*

As the Court is probably aware, we have had a great many men coming out of the forces, and we had a very great shortage of labor of the so-called old guard of skilled labor.

We have been able to take those men and train them in my plant from a date starting in a matter of a month or six weeks, when we have them off their credit, paying them nothing except credit that they receive, paying them nothing for their labor, and they have been able to make a living without using their credit, and I have had men that I started with no knowledge of
209 the jewelry business and earning as high as $38 a week in less than a year, and with other methods of manufacture this would have been impossible.

Q. That is, they required a longer time than that to make it by the sand casting or the cuttlefish method? A. Yes. If we had the same men to train by the old method it would take from three years to five years to make an article comparable to the one we produced by the Jungersen method.

Q. Now, have you also produced other models? Are these your designs? A. All with the exception of two pieces.

210 Q. Well, examine this box full of specimens of some sort or another and tell me what they are. A. We have the three-stone type of jewelry ring.

Q. What are these specimens? A. Those are waxes taken from the rubber molds. You have different styles of rings, all rings, or parts of rings, and here we have the signet type of ring, that which shows a design with the white gold application, and this is also the same thing.

Q. They are made in your plant? A. That is right.

Q. Under your supervision? A. That is right.

The Court: This is the material that would run out when you apply the heat?

The Witness: Correct.

Mr. D. Cooper: I will offer in evidence the box of waxes that the witness has produced.

(Marked Plaintiff's Exhibit 7.)

Mr. D. Cooper: All right. You may examine.

Cross Examination by Mr. Gröner:

Q. Mr. Shaw, you spoke of the method taught you by 212
Mr. Jungersen? A. I spoke of the method taught me by the Goldsmith Company of Canada under Mr. Jungersen's patent.

Q. Are you familiar with Mr. Jungersen's patent? A. To a degree inasmuch as you yourself had me read a good deal of extracts from it at the last hearing.

Q. And you had never read it before that time, had you? A. No, that is correct.

Q. And isn't it a fact that the method which you have there described included steps which you were unable to find in the Jungersen patent? A. I can't say that it does.

Q. I do not understand your answer. A. Well, you 213
asked me about in the patent. To the best of my knowledge I read different extracts from the patent. I did not practice my process from a patent; I practiced it from the teaching I received from the man who held the patent in Canada.

Q. And between 1935—I think that is when you said you started— A. Yes.

Q. —and 1945 when you testified you had never read the United States Jungersen patent, had you? A. Right.

Q. And you have testified, as I recall it, today that in making your rubber mold you made it in two parts with

214 *Plaintiff's Witness, George Shaw, Cross*

two vulcanizing operations, did you not? A. That is correct. We also made it with one vulcanizing operation.

Q. And how did you determine upon a parting line when you made it in a one vulcanizing operation? A. Well, this requires something which it would be very difficult to make anyone understand. We have a method of maintaining the model in the proper position in the frame, to support the tube, as a matter of fact, and that maintains the model in the position while we make this vulcanizing, and we apply rubber to both sides of the
215 model in position and maintain it there in position.

Q. And how do you then separate the rubber mold into two parts? A. It is cut apart in this instance.

Q. And how do you determine where to cut it? A. Well, we have a clear indication by your frame. You know that your model is in the exact center, and you cut down to that point, and then once you strike the model it is a case of working around it.

Q. And you also testified before, I believe, but you have not mentioned today the fact of the vibrating? A. Well, I think it is a matter of common knowledge that any mixture requires it to be vibrated or shaken in some manner to remove or to assist the removal of air.

216 Q. And did you do that with a sand mold? A. A sand mold is an entirely different thing. In fact, that is the worst thing you can do with a sand mold, to vibrate it.

Q. But there is nothing in the patent in relation to vibration in any event, is there, Mr. Shaw? A. No, there is nothing there that says how you should mix your solution. I mean, it is a practice that any person of intelligence does, that is, does things in a method to get results.

Q. But I asked you that there is nothing in the patent about it, is there? A. Not to my knowledge.

Q. Now, you spoke of casting your wax patterns in a centrifugal machine, which I think you said had been com-

monly used in dentistry for long periods? A. Correct.

Q. ? that correct? A. That is correct.

Q. Is there any difference in the action of that machine in the state of casting wax and in the ensuing state of casting the metal? A. There may be a slight difference in the manner of holding the mold.

Q. But the machine operates in the same way? A. It is centrifugally spinned, yes.

Q. And it does the same thing to the molten material, does it not? A. Yes, it fills the metal into the cavity 218
in the same way as the wax is filled into the mold.

Q. And the same need impels the use of such a machine in both cases, is that not true? A. Yes, I think it is the best method I know of for filling a rubber mold or filling a metal mold.

Q. I do not think that your answer is responsive.

Mr. Groner: Mr. Reporter, will you please read the question back?

Q. (Read.) A. Yes.

Q. So that all you do in your wax casting stage is what the dentist has been doing in his metal casting stage, is that not correct? A. To the best of my recollection. 219

Q. Have you any acquaintance with any other casting process as used in any other trade than jewelry? A. Well, I have a very slight knowledge of some other methods.

Q. Now let us develop that. How slight? A. Well, I have never seen a die-casting foundry, but I have some slight knowledge of what a die-casting consists of.

I have never seen statuary made, but like many other people I have read articles on casting and various types of foundry practice where casting is done. I know they have risers, and I know to eliminate the air they do certain things. I have a general knowledge of casting procedure, but very limited.

220 *Plaintiff's Witness, George Shaw, Cross*

Q. Don't you know that in statuary casting, just to take one branch of the art, you start with a model?

Mr. D. Cooper: Your Honor, I will object to this as beyond the scope of the direct examination.

The Court: I will allow it. I will see if this witness is able to answer it, but if he is not why, we will let it go out.

Mr. Groner: If he is not able to answer it, we are perfectly willing to stop.

The Witness: I am perfectly willing to answer if I can.

221 Q. (Read.) A. Yes, I understand that is so. This was vulcanizing.

Q. And don't you also know that in certain phases of statuary casting a rubber or a glue mold is then built up around the original model? A. Yes, I know there is such a thing, but that type of mold is of a very limited scope. I know that there is such a thing as a gelatin mold or a glue mold.

Q. And a rubber mold, don't you know that? A. I have never to my knowledge read of statues being cast in rubber.

Q. I see. A. If you consider gelatin rubber.

222 Q. Don't you also know that into such a gelatin mold wax is introduced in a molten state? A. No, my knowledge of that method of casting is that plaster of Paris was introduced in that mold to recreate a very different art object.

Q. In connection with the method which you have described as the Jungersen method, you spoke of centrifugally casting wax into the rubber mold? A. Yes.

Q. How was the mold itself held at the time of the casting operation? A. Well, I have seen various devices. In my own plant we have two plates there of aluminum. They are made of aluminum for lightness, and as we do not wish to overload the machine, we have a carriage, and we place this mold with our two aluminum plates

into the carriage, spring the top down and latch it and spin the machine.

Q. And if you left off the plates what would happen? A. Well, it is very elementary. I am afraid you have to have that mold held, and to have it substantially well held, otherwise you can't resume the casting, as the mold will leave the machine before you cast it.

Q. To make it perfectly clear, you did not disclose any methods to Mr. Baden when you saw him, did you? A. I had no authority. I could not possibly disclose it. I merely discussed it with him. 224

Re-direct Examination by Mr. D. Cooper:

Q. Are you experienced in dental casting in the sense of having done it yourself? A. No, just the knowledge I know of general casting practice.

Mr. D. Cooper: That is all.
The Court: You are excused.
(Witness excused.)

THOGER G. JUNGERSEN, called as a witness in his own behalf, being first duly sworn, testified as follows: 225

Direct Examination by Mr. D. Cooper:

Q. You are the plaintiff in this case? A. Yes, sir.

Q. Where do you live? A. Summit, New Jersey.

Q. And you are the patentee and the owner of the patent that is involved here? A. Yes, sir.

Q. You are a Dane by birth? A. Yes.

Q. Where were you born? A. I was born in Roskilde, Denmark.

Q. And you came to this country when? A. I have been over here many times, but I came over here and lived here since 1927.

226 *Plaintiff's Witness, Thoger G. Jungersen, Direct*

Q. And you are a citizen of the United States now? A. Yes.

Q. And at the time when you first came here to live in 1927, you were not a citizen? A. I came here as a visitor to sell some patents I had.

Q. Yes. A. But then I had to stay here to get them on the market, and I then changed my mind. My intentions were to go back, but then I liked to stay here, and I stayed here ever since.

Q. Was there a time when you were living in Canada?
227 A. Yes, I moved up to Canada because of the immigration statutes that you have to be out of this country and, well, I made an application for citizenship.

The Court: You mean for immigration?

The Witness: For immigration.

Q. While you were in Canada, was it then that you made this invention of the patent in suit? A. Yes, sir.

Q. Up to that time what had been your business? A. I had been an automobile dealer, a consulting engineer, and a manufacturer of different items in Denmark.

Q. Diesel engines, for example? A. I made Diesel engines, gasoline engines, and mostly in the motor line.
228 Q. That was in Denmark? A. In Denmark.

Q. Yes. A. Also made these reflectors, what we have on the highways. That is one of my inventions.

Q. Pumps for fire engines? A. Yes, sir.

Q. You made those also in Denmark? A. I made those also in Denmark and shipped them all over the world.

Mr. Groner: Mr. Cooper, I shan't contest your Christmas-New Year 1933 dates. He did what he did during the month of December of 1933.

Mr. D. Cooper: Well, he got up whatever is in this patent. Is that satisfactory?

Mr. Groner: That is perfectly agreeable.

Mr. D. Cooper: In the month of December, 1933?

Mr. Groner: Yes, sir.

The Witness: Should I testify how it was done?

Q. Well, I want to ask you as to the circumstances as to how you came about to make it? A. That was more or less on a bet that I believed that anybody could do something and could get a job in those days, and it was during the depression, and I made a bet with a friend of mine that I could take any job that he could pick out of a newspaper.

230 Q. Yes. And he picked out one? A. And he looked in the newspaper and said, "How will you do as a jeweler?" I said, "I will get that job if it is not taken."

And then I went to the jeweler that advertised, a Mr. Frenes.

Q. Yes? A. He was on Adelaide Street I believe in Toronto, and he wanted somebody to cast in sand.

Q. To cast jewelry in sand? A. Yes.

Then I applied for the job and he asked me if I was a jeweler, and I said no. Then he did not want to have anything to do with me.

I said, "Well, what do you care what I am if I can do what you want?"

231 And then I finally got him talked into giving me one of his models. I said, "You can give me the hardest one you got and if I can reproduce that to your satisfaction can I have the job then?" I said, "You are the judge. You can take me when you see what I can do."

And I took this model and thought it over very carefully when I went out of there how to proceed in order to get a good casting, and on my way home I went into a gasoline station, got some patching rubber that they use for patching tires and vulcanizing the tires, and then I went home and made a little frame which would hold in a piece of wood, and then I clamped—got the piece of board on each side in a clamp to hold these boards to-

gether, and I vulcanized my first rubber mold in an ordinary baking oven, and then I filled the mold, and first I tried all kinds of ways to fill the mold, and I had quite a little trouble with filling the mold with wax. I knew that the dentists were using wax patterns, and from experience I had some fillings taken and filled castings, and then I went to make these wax patterns, and finally I fell on the idea of filling by centrifugal force, and I took a clothes hanger, one of those clothes hangers—

Q. A wire clothes hanger? A. Yes, a wire clothes
233 hanger, and stretched it out and then made a swing out of that that I could swing around in my hand, and then I pushed the wax—forced the wax in there by centrifugal force, and then I got a pretty good example of the article I had used as a model.

Q. Yes? A. And after that, after I had produced the wax pattern I went to a mechanical dentist. I found the name in the telephone, one who had been casting for different dentists in Toronto, and I called him up and asked him if I could come up and do a casting in his place, and he agreed that I could come up there and talk it over.

When I came there he was very much interested. It turned out that this gentleman had been a jeweler before,
234 and he was most surprised to see what I was doing, and he said that I could use his shop, and I did.

Q. And as the result of all this did you produce it? A. Then after I had cast my final casting I went back to Mr. Fremes and showed him the casting, and then he said it was one of the finest castings he had ever seen, or the finest.

Q. And did he give you a job? A. He said, "You can start right away."

Q. And he gave you the job? A. Yes.

Then I explained to him that I had a bet with the fellow that I was going to get this job, and he needed a job very badly, and I got him in.

I said, "If I can teach him will you then employ him?" And he agreed, and we set up a little casting shop in an open loft that he had there, a big open space, made a partition there, put benches up and so on, and it was done during December, 1933.

Q. Yes? A. And between Christmas and New Year's, 1933, we were producing our first casting.

Q. Now, following the creation of this process you filed applications in various countries, did you? A. Yes. When I heard that there was something unusual that I had done with my first casting, then I offered Mr. Fremes to sell him the patents on it, and I told him that I would apply 236
for a patent and when I received my patent I would sell it to him.

He was very interested, and we agreed on a price of $2,000, which was for Canada alone.

After I had been there for a while and I wanted my money for it, then he tried to put my price down. He said, "I will pay you $300 for it."

I told him, "You have been to an attorney and got some advice without giving him the benefit of the truth," and I said, "otherwise you would not get to this result."

Q. Never mind about that, but now you fell out with Fremes, did you, at that time? A. I did.

Q. And did you proceed to apply for patents in Canada 237
and in the United States? A. Yes.

I then told Mr. Fremes that I am willing to sell it to him at the price we have agreed, or even willing to go down a little in the price, because I felt that Mr. Fremes should have it.

Q. Yes. A. I had worked together with his son, and was quite friendly with him. I said, "But you are doing me a favor in not taking it." I knew that I can go out and sell it, and the same day I went out and sold it. I believe it was four or five thousand dollars I got for it from Goldsmith Bros.

Q. From Goldsmith Bros.? A. Yes.

The Court: You sold the patent or the exclusive rights?

The Witness: No, I sold the exclusive rights in Canada under that first patent.

Q. And the right to license others? A. Yes. Then later Fremes had to buy a license from Goldsmith and pay $2,000 for the license.

Q. In what other countries besides the United States and Canada did you apply for patents? Did you apply in Great Britain? A. Yes. I have a patent in around 20 countries.

239 Q. And did you have some difficulty in getting your British patent? A. Yes, I have had difficulty as has happened to so many other inventors when you have something that is worthwhile and somebody else wants to take it, and there were different people in Great Britain who wanted it, and there was one in Toronto when he heard about this method, and he came from Johnson Mathey.

Q. M-a-t-h-e-y? A. Yes, and supposed to be the biggest precious dealer, bullion dealer in the world, and there was the general manager, Mr. Cushmaker, who came over here.

Q. Well, as a result of something or other what happened with respect to Mr. Cushmaker? A. Mr. Cushmaker
240 asked for an option to buy it in England, and I demonstrated it to him and he paid me, as far as I recollect, $1,000 for an option, and then I did show him the methods and he was to go back and then let me know if he wanted the patent in England. I taught him the methods, and then he went back but he did not buy the process but he started to exploit it in England without any license, and then when my patents were past the examining state—

Q. In England? A. Yes, and were ready to be issued.

Q. Yes? A. Then he objected to its issue in Great Britain.

Q. And the result of that was some proceeding that came before Mr. Justice Luxmoore? A. Yes.

241

Q. And the result of that was that Judge Luxmoore wrote a memorandum or an opinion ordering the issuance of your patent? A. That is correct. That was first after I had lost in the lower court.

Q. Yes? A. And I remember very clearly, he said, "Well, you will never"—he said, "I was a fool to come over here and find them, because my case was lost before coming to trial."

Q. That loss was in the Patent Office? A. No, as far as I understand it was in the lower courts.

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Mr. D. Cooper: All right. I will offer in evidence Justice Luxmoore's opinion ordering the patent to issue.

The Court: Is there objection.

Mr. Groner: No objection at all, your Honor.

(Marked Plaintiff's Exhibit 8.)

Q. Well, after a while you came to the United States with this patent, didn't you— A. Yes, sir.

Q. —or with your application, and ultimately you got admitted to citizenship in the United States? A. Yes, sir.

Q. And to what extent have you issued licenses here under it? A. I have somewhere between 60 and 70 licensees I believe.

243

Q. Licensees in the United States? A. Yes, using this method here.

Q. Can you name some of the prominent ones? A. Yes. There is J. R. Woods; and most of the larger jewelry firms.

Q. J. R. Woods here in New York City? A. Yes.

Q. And Krementz in Newark? A. Krementz in Newark, and Oscar Hyman was one of our finest jewelers, and it goes down to even one-man shops.

Q. Now, have you licensees abroad besides in Canada? A. Yes.

Q. Where? A. I have licensees in most of these countries that I have patents in.

Q. In England? A. I have in England, France, Belgium, Sweden, Norway, Finland, Denmark, in Germany, Brazil, Argentine, and in Java.

The Court: That bet turned out to be a lucky one.

The Witness: I beg your pardon?

The Court: That bet turned out to be a lucky one.

245 The Witness: Yes, sir, so far.

Q. Now, Mr. Jungersen, will you demonstrate your process, please. Explain the whole thing. A. Exhibit 3, the one part of Exhibit 3 would present the same thing as a plaster base before we start to make the model. That is this open space in here (indicating). That is our plaster base. The other, on the outside is just as a short cut. Instead of using plaster all the way up and carve all these lines, they use a metal frame in this case, and only have this here open for the plaster (indicating).

The Court: The interior part?

The Witness: Yes. We fill in this here with the plaster
246 and then we put the model in there. It is part of Exhibit 6. It is the metal polished ring here (indicating).

The Court: I see. All right.

By the Court:

Q. Originally a model was placed in the same form in which you have now placed the finished product? A. That is correct. Then we put a frame around it and we put some layers of rubber inside the frame, and then we put it into a hot press which will heat up rubber so as to get a kind of a fluid state or plastic state, anyhow, and then that will take all the details of the model that you have in there.

Now, after that is done then the whole thing—after that is vulcanized, this plaster base is taken off, leaving the pattern in the first half of the rubber mold. Then you place another frame on top of the first one, and put some more rubber in and vulcanize it once more, and you get the other side. Now that is one way—

Q. Just let me ask this: These little protuberances are just to hold the mold from sliding? A. Yes.

Q. They are no part of the design? A. No part whatever of the design.

Now, this mold here is then oiled a little on the surface and put together and a plate put on each side— 248

Q. A metal plate? A. Yes, or any other thing.

Q. Just to hold them together? A. Yes, hold them together and a little clip put in and hold them together again, and then it is placed on the centrifugal casting machine. Then we take some wax that is melted and spin the machine and pour it in and let that go.

Now, the centrifugal force will throw the wax in there and it will start to fill up the mold from the far end, so the wax is put in there perfectly filling the cavity that was in there.

Q. This centrifugal machine operates on a spring? A. Yes, in this case it is on a spring. It may be motor-drive or any way at all. 249

Q. Yes? A. Now, this here, the plate, is taken off, and we open the mold, and here is the wax pattern.

Q. That shows it fairly firm? A. Yes, fairly firm. Generally we work with two molds at the same time, so we produce about 60 waxes to an hour. And here is the model.

Q. Which is identical with the one that is in evidence as part of Exhibit 7? A. Yes. Now, this wax pattern or these wax patterns are then set on a rubber base. It is like this here (indicating). And a metal cylinder is put around it; this cylinder here (indicating)—

Q. A metal cylinder is inserted around it? A. Yes. That is what we call a flask, and then that is filled up with plaster of Paris and silica sand.

Q. The plaster of Paris is just poured in? A. Just mixed up and poured in. Of course, we are speaking about the vibration. Whenever you mix plaster up you mix some air in it and you try to get as little air as possible, and one way to get it out is to vibrate it a little or shake it, not try to mix so much in. Then you pour it around here, and that sets, and after that is set the rubber base is taken off the flask. Now, that leaves a flask similar to the one here that was Exhibit 4. This will present a flask with two rings invested, and one of them is burned out, and cut in section. The section of the cavity is made inside of the plaster of Paris.

Now, you could burn these out in the oven, and that leaves a true cavity where you can cast the final metal in. Now, that can be cast with centrifugal force or gravity or vacuum, or any manner.

Q. As long as you get the metal to fill in the cavities? A. Yes. The main idea is to produce a mold that has all these details in it. That is the reason this process here can create so many new designs and new beauty in jewelry-making, because it leaves the field completely open. You can make anything that you can make by hand.

Q. This is not limited to rings, of course? A. No. Here is a bracelet or pendant or any kind of jewelry you want.

Q. Do you know Mr. Baden of Baden & Foss? A. Yes, sir.

Q. When did you first contact him? A. I would give the exact time between the 4th of January, 1935, and the 10th of January, 1935.

Q. It was before your patent had issued? A. Yes, long before.

Q. Did you talk to him about your process? A. Yes.

Q. What if anything did you show him? A. The first time I met Mr. Baden was when Mr. Shaw and a Mr.

Walsh from Toronto came and told me that they had talked to Mr. Baden; he was very much interested to see my type of casting, and if I would go with them over and see him. At that time I had a little workshop at 71 Nassau Street, and Mr. Baden was right across the street from there; and I went over with Mr. Shaw and Mr. Walsh and he introduced me to Mr. Baden. Mr. Baden I understood to be a good friend of Mr. Walsh, and that was the reason he wanted to bring us together.

At that time I showed only Mr. Baden my rings that was cast.

254

By the Court:

Q. You showed him the final product? A. The final product, yes, and he asked how they were done. I did not show that method around because I had no protection on it at that time.

Q. In other words, you did not disclose the method of operation? A. No, not at my first meeting.

Q. Not at that meeting? A. Yes. Then after Mr. Baden had promised me to take a license—I had even the contract written up in Mr. Sigmund Cohen's office, down at 44 Gold Street—I had a contract written up between Mr. Baden and myself as a licensee; then I showed him my mold—

255

Q. When was that? A. That was before I went home from New York.

Q. Approximately when? A. That may have been not later than January.

Q. About 1935? A. 1935, yes. And Mr. Baden promised to sign the contract, and I left it in his office and told him because of the type of work he was doing he should use a metal mold instead of a rubber mold.

Q. You showed him then the whole process? A. I did not show him the casting process because I was in his office, but I took the molds and my equipment, my frames,

256 *Plaintiff's Witness, Thorger G. Jungersen, Direct*

and so on, over to his office and showed him right on his own desk, like I demonstrated here, and explained how we were doing it.

By Mr. D. Cooper:

Q. Have you here any of the samples that you showed him at that time? A. Yes. I believe there are some of those already in evidence. I can pick out some of them anyhow.

Q. Are any of them in this exhibit I hand you? A. This one I know definitely because that was produced in Mr.
257 Fremes' place. This one too (indicating). This one I made for a party in Hamilton, Ontario (indicating); and this one here was there too.

Q. All of these excepting the one I now hold up were those that you showed him at that time? A. Yes.

Q. You showed him all on this particular bunch excepting the one that I now hold up? A. That one, I don't recall if that is a little later.

Mr. D. Cooper: Well, I will offer in evidence seven—

The Witness: And those are the identical rings, too.

258 Mr. D. Cooper: This is an exhibit in another case.

(Marked Plaintiff's Exhibit 9.)

Q. Well, at any rate, Mr. Baden did not execute the license agreement? A. Well, he put it off and put it off, the signing of the contract, and I always hoped to talk him into—

Q. Very well. He did not sign it? A. He did not sign it, but when he finally said no, he would not sign it, then I gave him the notice of infringement.

Mr. D. Cooper: You may examine.

Cross Examination by Mr. Groner:

Q. And that was in 1943 that you gave him the notice of infringement? A. I cannot give you the date because my visits to Mr. Baden had been so many, and so many discussions between us, I could not give you the date or even if I did send him a notice of infringement. I said to him we were going to sue him.

Q. So for something over eight years this courtship continued, is that correct? A. Well, you must remember that after Mr. Baden—

Q. Just answer my question, Mr. Jungersen. It is very 260
simple. A. Yes, that is correct. It may be correct.

Q. Well, is it or isn't it? A. Well—

Mr. D. Cooper: He does not know.

A. Well, I don't know if eight years elapsed.

Mr. D. Cooper: Does your Honor want this demonstrating apparatus marked?

The Court. I do not unless you want it.

By Mr. Groner:

Q. Now, I hand you a letter dated July 16, 1943, addressed to Baden & Foss, Inc., on the letterhead of Victor 261
Davis Werner and signed by Mr. Werner, and ask if that is the notice to which you referred? A. Yes, I believe that is the one.

Q. So there is a period of eight and a half years from the time you first contacted Mr. Baden, according to your story, and the time this notice went out. You mentioned between January 1 and 10, 1935, I believe? A. Yes, that is correct.

Q. And it is my recollection that Mr. Shaw referred to the first part of January, 1936. If he did make that statement— A. I was in error.

Q. You were in error in your statement? A. I was in error in my statement on the year.

262 *Plaintiff's Witness, Thoger G. Jungersen, Cross*

By the Court:

Q. You think it is 1936 and not 1935? A. Well, right offhand here I cannot—

Q. You are not sure? A. I can refresh my memory if I can see some papers on it.

By Mr. Groner:

Q. In all events, when you first saw Mr. Baden you did not disclose your process to him, did you? A. At my first meeting, no.

263 Q. Or any other meeting, did you disclose the complete process? A. I did not invest in front of him, but I explained how it was done, so anybody with the least little intelligence could have done it.

Q. Isn't it your usual policy, Mr. Jungersen, to refuse to give information as to the process until a license had been signed? A. Naturally, but when you take a man's word of honor—

Q. Wait a minute— A. —that is what I went by. I did not know that he would not keep his word.

Q. It was your usual policy not to disclose a method until a contract was signed, was it not? A. That is correct.

264 Q. And you say you did it in this case? A. That was my usual method, not to disclose anything, keep it secret, unless I had a contract signed or unless a person is going to give me their word of honor they will not divulge it to anybody else or take advantage of me, and I told that to Mr. Baden at that time.

Q. Do you have any writing on that score? A. No.

Q. None at all? A. No, but he showed up not to be a gentleman.

Q. Now, Mr. Jungersen, in your testimony this morning you stated in substance, as I recall, that as a result of a bet you offered Fremes to do the most complex casting he could give you, is that not correct? A. I don't know if I used these words, but in reality that is what I said to him.

Q. You went to Fremes as a result of a bet? A. Yes.

Q. And then you told Fremes when you got there that you could do the most complex casting he had? A. Yes, he could give me any sample he had and I would do the worst one he had.

266

Q. And you also testified that on your way home you stopped by and bought some rubber? A. That is correct.

Q. You were familiar at that time with the fact that rubber molds were old, were you not? A. No.

Q. It was a brand new idea? A. No.

Q. Well now, what was it? Did you know of it or didn't you? A. Well, I had known about that later on.

Q. At the time you came from Fremes' establishment you did not know about a rubber mold? A. I had never read anything about anybody using a rubber mold for wax casting, if that is what you are trying to find out.

267

Q. And you also knew of the formation of wax patterns in molds at that time, didn't you? A. The only type of wax pattern that I knew of at that time was where they were taken of a tooth.

Q. Taken what? A. Where a dentist had taken an impression of a tooth, and also for the forming of the roof of the mouth, or bridge construction on top of a model, and you shape that by hand on the model, and faintly, that is the method that is used.

Mr. Groner: May I have that read, your Honor?

The Court: Yes.

(Answer read.)

The Witness: Pardon me, could I correct?

Mr. D. Cooper: Certainly.

The Witness: Because I had myself formed some wax patterns prior to that by carving them, and some I had made plaster of Paris flat piece, but I had no design on this here.

Q. You knew nothing, however, of forming a wax pattern in a rubber or metal mold at that time, is that correct? A. Well, if that is a wax pattern for the process that you are speaking of here, no.

Mr. Groner: Now, to interrupt myself a moment, your Honor. I have here parts of the record in the pending New Jersey case, a separate volume covering the exhibits. With your Honor's permission I should like to introduce it now so that your Honor may have it before you. It is only the prior art which is in the record in the Court of Appeals, which is exactly the prior art which I did offer here separately. I am entirely willing that it be marked for identification only.

The Court: All right. Mark it for identification only.

(Marked Defendants' Exhibit B for identification.)

Q. Mr. Jungersen, you took out a British patent, I believe, which corresponds to the patent in suit? A. Yes, sir.

Q. Now, I shall read to you from that patent and ask if that statement there, in view of your testimony here this morning is incorrect?

Mr. Groney: This British patent incidentally was filed, your Honor, on September 27, 1934, and appears on page 495a of the volume I have just given your Honor.

Q. I read from line 19:

"In the casting of metal it is not broadly new to make an elastic mold from an original sample or model, to produce a wax or fusible pattern with the aid of the elastic mold and to remove the pattern from the latter and invest it in a final mold from which the wax or fusible pattern 272
is subsequently melted out to permit of the pouring of metal into the mold cavity thus vacated."

That was your statement of September 27, 1934, was it not? A. Yes, but there is a little difference from the time I invented this here and that statement when written.

Q. So, between Christmas of 1933 and September of 1934 you had learned that there were rubber molds? A. Yes.

Q. And that there were wax patterns made in those rubber molds? A. I understand they made rubber molds before I was born, but that is not my invention.

Mr. D. Cooper: Never mind. 273

Q. You also testified this morning, I believe, of the dental practice of investing the wax pattern and then burning it out; that is correct, is it not? A. Yes.

Q. And you also were familiar with the dental practice of centrifugal casting of metal into the cavity in the investment; that is correct, isn't it? A. I don't recall now how much I knew about that, but I have heard about this casting by centrifugal force anyhow.

Q. Anyway, when you left Mr. Fremes on this afternoon you knew enough to call up a dental laboratory, did you not? A. Yes.

Q. And they cast the metal into the investment? That is your story anyway, isn't it, Mr. Jungersen?

Mr. D. Cooper: Don't be so nasty about it.

A. I did it myself there.

Q. You did it there? A. Yes.

Q. And you had knowledge that that had been done before, had you not? A. At least I had heard about it. I don't know now if I had known about the machine at that time or not.

Q. You did have some knowledge at least of the fact
275 that dentists used centrifugal force to cast metal? A. Yes, sir.

Q. Now, in a centrifugal machine, such as the one you have used this afternoon to demonstrate with, you have on one of the arms a little crucible that holds your molten material. That is correct, isn't it? A. Yes, sir.

Q. And beyond that and on the same arm you have your mold? A. Correct.

Q. And when the machine is revolved, when it is centrifuged, it makes no difference whether it be molten wax or molten metal, does it, in the fact that it throws out the molten material into the gate? A. It would throw out any-
276 thing of weight if it is made free to leave.

Q. And that applies to wax as well as metal, does it not? A. It applies to wax and metal, but in a greater amount to the metal than to the wax.

Q. But they both operate in the same way under the influence of the centrifugal machine? A. The same principle is used, yes.

Q. And the molten material in both cases is introduced into the mold? A. Yes.

Q. Now, isn't it the fact that the machine is used in either case where gravity acting alone is not sufficient to fill the mold? A. No, that is not exactly right.

Q. Well, will you explain to me what is right. A. The

metal is a substance that will flow into the mold, and with less friction than the wax will.

Q. You are speaking there only of a matter of degree, are you not, Mr. Jungerson? A. It is under an entirely different circumstance. If you are speaking about a mold that has been used by the dental trade, for filling that with centrifugal force, that is a different mold, and whether the metal can enter and force the air out through the pores in the mold, but that is an entirely different thing when you cast the wax in there, because the wax comes in and that is not a porous mold. In this case that is a closed mold where the air can only escape out through the gate ordinarily, and if you pour the wax in then it will only come in halfway and it will stop. 278

Q. Now, let us get back to my original question— A. Because it is not air inside.

Q. If you have a mold of whatever nature and you have a molten material, whether metal or wax, and you flow the molten material into the mold or cavity, and do not get a fine impression, if in either of those occasions you use centrifugal force you will serve to throw the molten material into the remote parts and all the intricate parts of the mold, will you not? A. I think not. It was so long that I could hardly answer it. 279

The Court: You can't answer the question?

The Witness: No. If you will please confine it to one mold at a time and not take any kind of a mold, because then it is impossible to answer it by anybody with any common sense.

Q. You can restrain your common sense to the answers. A. Yes, but it cannot be answered the way you asked it. You asked me it in a way so that it cannot be answered.

Q. I think it is perfectly plain that the substance of my question is if gravity is not sufficient to fill all the crevices of the mold— A. What mold?

280 *Plaintiff's Witness, Thoger G. Jungersen, Cross*

Q. It does not make a particle of difference.

The Court: Just a minute. If you do not agree with the question, you will answer it by the word "No."

Now, go ahead and put your question.

Q. Now, in such a case do you not get the pressure which gravity will not afford by using some machine like a centrifugal machine? A. I cannot either answer yes or no to it, because to one mold it will be yes and to another mold it will be no.

281 Q. I see. A. And if you do not understand how to split it up and give me a question that is intelligent then I can't answer you.

The Court: Well, Mr. Witness, supposing you refrain from commenting upon the merit of the question, and you just try to answer the question.

The Witness: It cannot be answered.

The Court: Very well. That is your answer.

Put your next question.

Q. Other means also are used to fill molds of different character? A. Pardon me: I did not hear the first words.

Q. I say other means also are used to fill molds of different character when gravity is not sufficient, isn't that 282 true? A. Yes.

Q. And they include as the simplest example probably the eyedropper, do they not? A. It all depends on what you are speaking about.

Q. The eyedropper may be used to inject a molten material into a mold, may it not? A. What type of mold?

The Court: Some type of mold.

Q. It does not make any difference. Any type of mold. A. Yes, but if we are speaking of a sand mold here, small mold or a big mold, I don't know, and I cannot answer your question.

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Q. Assuming a mold of proper size. A. Give me an example, please.

Q. It is not necessary that we have further examples other than I have given you. A. I cannot answer that type of question, because it is not correct and it is not correctly asked.

Q. All right. If we have a ceramic mold, can you not inject wax into that type of mold with an eye dropper? A. That is possible. In some cases you can and in some cases you cannot.

Q. And you can also— A. In practically—

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Q. —inject wax similarly into a metal mold, can you not? A. Possibly.

Q. And you can also inject wax into a rubber mold, can you not? A. That is possible. You seem to know it better than I do.

Q. I want you to give us your best information, Mr. Jungersen. A. Will you please give me an example of what your question is or show me one of the molds and I will answer you, but if you cannot give me that I can't answer.

The Court: You proceed and go ahead and answer the questions as best as you can.

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Q. You can do the same thing, that is, injecting molten material with a syringe, can you not?

The Witness: Mr. Cooper, could I please refrain from answering this type of questions, because it does not make head or tail.

The Court: Now, Mr. Witness—

The Witness: Yes, your Honor.

The Court: —your counsel is here to look after your interests.

The Witness: Yes.

The Court: And if any question is improperly put, I have no doubt that he will be very alert to call the Court's

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attention to the impropriety of the question. Until he does that, you will just have to do your level best to answer the questions.

Now, of course, if the question in your judgment is incapable of being answered you will say, "I can't answer it" or "I do not know the answer," or whatever answer you choose to make, but you must not comment upon Mr. Groner's capacity or lack of capacity to frame an appropriate question in a court of law. Undoubtedly in the laboratory you will be able to challenge his capacity for framing the questions, but here you will have to leave that
287 to your counsel.

The Witness: In this case here—

Mr. D. Cooper: Wait a minute. If your Honor please, it seems to me that the questions are perplexing and misleading anyway, because anybody can take an eye dropper and squirt something into a void, but what the witness is puzzled about here, or what he is assuming is that counsel is trying to get him to say that will be an adequate squirt for the purpose intended without telling him what the purpose is, or what kind of a mold it is.

The Court: This witness is a skilled person—

288 Mr. D. Cooper: He is.

The Court: —and if he wants to answer that you can get the thing filled, but it won't serve the purpose, he can say so, or if he wants to say that you can get it in but you will get your fingers burned because it is hot, he can say that, too, I suppose.

Mr. D. Cooper: He is a little bit weak on the English language, too.

The Court: That is all right, but he is not having any difficulty in getting himself understood.

The Witness: In this case, the questions, all the questions that have been asked me here, to answer them I

can answer both yes and no, and you cannot say that the thing is both yes and no.

The Court: Well, assuming that the answer is vague, why, we will let your counsel develop it to its greater fullness, if necessary, but you give the best answer you can to the question that is asked, and in that way I think we will save time.

Mr. Groner: May I have the last question read back, please?

(Question read.)

290 Q. Will you please answer that question? A. Will you please repeat that question?

(Question reread.)

A. I presume you can inject molten material with a syringe, but for what purpose?

Q. You can inject wax, with a syringe, can you not, into a rubber or metal mold? A. Yes, if you have a closed —no, I was trying to say if you had a closed system you cannot inject it, but you can inject it into any void.

Q. You can then inject wax with a syringe into either a multi-part metal mold or into a rubber mold, can you not, Mr. Jungersen? A. I believe so, yes.

291 Q. And you can do the same thing with molten material with an air pressure machine, can't you? A. I believe so, if you don't trap the air.

Q. And the vacuum machine also, Mr. Jungersen? A. Yes, if you don't trap the air or freeze it up on the way in.

Q. But all of those instrumentalities are used for the purpose of injecting a molten material into a mold, are they not? A. I presume so, yes.

Q. And have been for some time? A. A syringe is a very old instrument.

Q. I beg your pardon? A. A syringe is a very old instrument.

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Q. And so is the air pressure machine, isn't it? A. Yes.

Q. And so is the centrifugal machine, isn't it? A. Yes.

Q. You have, as a matter of fact, asserted infringement of your patent by third parties for using a syringe, have you not? A. Pardon me. I do not understand the word "asserted."

Q. You have claimed that parties not here— A. Yes.

Q. —have infringed your patent, the patent here in suit— A. Yes.

293 Q. —for using a syringe and a metal mold, haven't you? A. Yes, sir. That was one of the methods I had taught and one of the methods I had tried to cover in my patent.

Q. Now, Mr. Jungersen, I am going to refer you to your patent—

Q. Do you find any reference in that patent to the use of a metal mold? A. I understand that the patent—

Q. I did not ask you that, sir. I ask you if you find any reference in your patent to a metal mold? A. Yes.

Q. Would you mind pointing it out to me, or pointing out all the references to a metal mold in your patent? A. Claims 5 and 6.

294 Q. I beg pardon? A. Claims 5 and 6.

Q. In the disclosure preceding the claims, Mr. Jungersen, do you find any reference to a metal mold? A. As far as I understand it then, claims 5 and 6 anyway refers to it, and you have only to disclose one way out of maybe a thousand different things to—

Q. Are you familiar, Mr. Jungersen, without making an examination of your patent, with whether it discloses any means of applying force for the purpose of casting a molten material, either wax or metal, other than centrifugal force? A. Yes.

Q. Would you mind referring me to the reference you made there? A. An applied force.

Q. I say, is that all? A. I don't recall. 295

Q. And that, too, appears in claims 5 and 6, is that correct? A. It also appears in claim 4, as far as I recall.

Q. Mr. Jungersen, isn't it the fact that the method disclosed in your patent has application to the casting of other articles than articles of jewelry? A. If you refer to my method of precision casting, which is covered by other applications to others, well, that is an entirely different thing.

The Court: No, in this patent, is that limited to jewelry?

The Witness: I have no knowledge of how much this 296
patent covers. I think it would be difficult, your Honor, to say exactly what it does cover.

The Court: Have you issued licenses for patents other than the patent in suit which has application to the casting of other articles than articles of jewelry?

The Witness: The only license I have given to them is under all my patents that I have, and they can have or the patents cover all of the things. They have whatever is covered by any of my patents.

Q. And that license includes this particular patent here in suit, does it not? A. It includes everything I have made that they can use in that process. 297

Q. You granted a license on July 15, 1943 to Harry Koppel, did you not? A. Yes.

Q. This is a copy of that license? A. I presume so. I can only go by the paper there.

Mr. Groner: May it be understood, Mr. Cooper?

Mr. D. Cooper: Why, yes.

Q. Mr. Jungersen, this license here states in the first whereas clause: "Licensor has heretofore granted to licensee a limited license to manufacture and sell articles of jewelry cast from gold and platinum and from alloys under U. S. letters patent No. 2,118,468," which is the

patent here in suit, and I discontinue my quotation. Several other patents also are referred to, and the second whereas clause is: "Licensor represents that he has made certain improvements and adaptations of the methods described in the aforesaid U. S. letters patent whereby articles such as small machine parts, instrument parts and other small articles for use in furthering the war effort of the United States can be manufactured." That is a correct statement, is it not? A. I never seen this, but to my recollection I did not see it, and I did not arrange
299 for this license. It was my attorney, Mr. Werner, who did the whole thing.

Q. I see. A. And I tried—when the war started I tried to make all my licensees in jewelry use a method that I had made for precision casting.

Q. All right. A. And use whatever they could to help in producing articles for the war.

Q. And you granted that license, did you not?

Mr. D. Cooper: Wait a minute. I would like to have it appear now that as to this license the signature of Mr. Jungersen is in typewriting, the licensor, and Victor D. Werner, his attorney, which explains the witness's last answer that he did not
300 know about it.

Mr. Groner: Very well.

Q. You did grant licenses for war precision casting under a number of patents, including the patent in suit, did you not? A. Yes, sir.

Q. And the precision casting entailed the system of first taking the model and making a mold around it, didn't it? A. Yes.

Q. And then centrifugally or by other applied force, make a pattern in the mold; that is correct, isn't it? A. I answered you yes. On the first it is partly yes, and that is also partly yes on the second question.

Q. Well, where does the partly no come in? A. Because there are a number of patents.

Q. I understand that. A. We developed all different things that could be used for the war effort.

Q. Mr. Jungersen, please understand me. I am not trying to go into the war effort. A. The United States Government has a license under it.

Q. That is fine. A. All my patents.

Q. I am not talking about or am not going into any of the other patents. I asked you if in precision casting of the war work all your licensees under these war licenses 302
have not started with a model, and you answered me yes, I believe. A. Some of them start with a model and some of them do not start with a model.

Q. Good. In either event they make a mold? A. Not in either event either.

Q. Well, when do they not make a mold, or when do they make a mold? A. You see, you ask about many things at the same time.

Q. I am asking only about one thing now, Mr. Jungersen. A. There is a process where we make a model and we make the mold around the model. We cast wax or other material in which we apply force, yes.

Q. And they did that in the war work, your licensees 303
did it in the war work that we have been referring to? A. There have been made millions of castings in war work on this here where they could not make it with any other method.

Q. All right. Now, isn't it the fact that the patent in suit discloses a method which is susceptible of use for the casting of other articles than articles of jewelry? A. I think the language in the patent shows—

Q. I am not referring to that now. I am asking you if the method there disclosed cannot be used for other purposes than casting jewelry? A. It can be used for other purposes.

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Q. Good. Thank you very much, Mr. Jungersen. Now, you referred in your direct examination to Judge Luxmoore's opinion; that is correct, isn't it, Mr. Jungersen? A. Yes, sir.

Mr. Groner: Incidentally, your Honor, Judge Luxmoore's opinion appears on page 508-A of the volume I handed your Honor.

Q. Isn't it the fact that prior to his decision in that matter, Johnson Mathey, which originally had opposed the grant of your patent, had made a license with your
305 licensee, the owner of your patent in England?

Mr. Cooper: I concede that because it is stated in Judge Luxmoore's opinion.

The Court: Well, Judge Luxmoore's statement would not constitute evidence in this case but this witness's testimony would.

A. I did not know about it and it was not on my behalf.

Q. You had prior to Judge Luxmoore's opinion granted complete rights either by transfer or by exclusive license to a Mr. Tyler, had you not? A. That is correct.

306 Q. And they had been granted in April of 1937? A. But what Mr. Tyler did—

The Court: Wait a minute. Just answer the question. When was the date? Was it in April, 1937? Is that correct?

The Witness: I presume it is. I don't recall.

The Court: Go ahead. Put your next question.

Q. Now, you also referred to licensees within the United States. I am going to ask you which of the following are licensees of yours: Is Otto Baer a licensee of yours? A. I don't recall the name.

Q. That is a right large jewelry concern, isn't it? A. I don't recall the name. I never heard about them.

Q. Is Ostby & Barton a licensee of yours? A. No, sir.

Q. They are a right large concern, aren't they? A. Yes.

Q. Is A. Schwartz Jewelry Company of Buffalo a licensee of yours? A. No.

Q. Is Star Ring Manufacturing Company of Buffalo a licensee of yours? A. No.

Q. They are both right large concerns, are they not, Mr. Jungersen? A. I don't know of their size. 308

Q. Milton Reich of Buffalo? A. I never heard his name, to my recollection.

Q. J. R. Wood & Sons, New York, is a licensee, is he not? A. Yes.

Q. And so is B. F. Hirsch Company? A. Yes.

Q. Is the California Ring Manufacturing Company of Los Angeles a licensee of yours? A. Yes, they are.

Q. Since when? A. As far as I recall, a license was issued to J. Margolin. That is a number of years ago.

Q. Is Koke Slaudt & Company of Los Angeles a licensee of yours? A. Yes.

Q. Are Granat Brothers of San Francisco a licensee of 309 yours? A. No.

Q. Do you know them? A. Yes, I do. In fact, he wanted a license at one time.

Q. A right big concern, isn't it, Mr. Jungersen? A. Yes. He wanted to get some special concession and I did not give them anything else but what I have given everybody.

Q. Is Bojar of Providence a licensee of yours? A. No.

Q. Is Heller & Company of Providence a licensee of yours? A. I don't know of them.

310 Q. Is Thomas Poole of Providence a licensee of yours? A. No, I don't know them.

Q. Sammantio & Sanchirico, of Providence, are they a licensee of yours? A. No.

Q. They too are a right large concern, are they? A. I don't know them.

Q. Herf-Jones Company, Indianapolis, are they a licensee of yours? A. I don't think I know them either.

Q. Is Goodman & Company of Indianapolis a licensee of yours? A. He is not. I knew him but he is not a licensee.

311 Q. I beg your pardon. A. I know him but he is not a licensee.

Q. A right big concern, isn't it? A. I don't know.

Q. Is Eisenstadt Manufacturing Company of St. Louis a licensee of yours? A. Yes.

Q. Since when? A. Since 1936, in January.

Q. Is Jacquard Jewelry Company of Kansas City a licensee? A. I don't know them.

Q. Is Burr-Patterson and Auld Company of Columbus a licensee? A. I don't know them.

Q. Is Jones & Woodland of Newark a licensee of yours? A. Jones & Woodland? I believe he is a licensee. I be-

312 lieve that is the same as Krementz.

Q. Is Jabel Ring Manufacturing Company a licensee? A. They are not.

Q. Or is Simon Manufacturing Company of Newark a licensee? A. They are not. Are all these people casting?

Q. I am not on the stand, Mr. Jungersen. Now, among your United States licenses you did grant a license to Untermeyer, Robbins & Company, Inc., did you not? A. That is correct.

Q. Is that your signature to that license (indicating)? A. I believe it is.

Mr. Groner: This is the one in evidence.

The Witness: I believe it is.

Q. Now, I read you a part from that license and ask you to explain the fact situation. Paragraph 14: "It is also understood that the party of the first part"—that is you—"will to the best of his ability make all reasonable efforts to prosecute and defend his patent rights against infringement for the protection of himself and his licensees. 15. Anything herein to the contrary notwithstanding it is understood and agreed as follows: (a) 314
the party of the second part"—that is Untermeyer-Robbins—"reserves the right to do all casting of gold jewelry by centrifugal force and make all metal molds for the purpose of making wax impressions under the same methods as heretofore used by the party of the second part." Will you explain why you gave Untermeyer-Robbins a right to do what you now claim is an infringement of your patent? A. Yes, that is easy to explain to you. It was told me that Untermeyer-Robbins would be the hardest jeweler to sell a license to in New York, and I made a bet with Mr. Sigmund Cohen that I was going to sell him a license. They were infringing at that time. I went up there and I said, "After we have taught you the 315
method, and you like to use the metal mold for producing your jewelry, you will get a free license for that. Anything you produce in your metal mold you can have free."

Q. Do you mean, then, that your patent does not cover the use of a metal mold? A. No, sir. The only reason I was so sure, when he got started on it, then he would use rubber mold, and they do use rubber molds.

Mr. D. Cooper: That license was granted before the patent issued, wasn't it?

Mr. Groner: That is correct, Mr. Cooper. But

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it is fair to add that the license now does not cover metal molds.

The Witness: The rubber mold is much superior to the metal mold. I did it in another case in Chicago where—I can't remember the name, two people in Chicago. I told them I would give them back their money and they can have a free license if they would use the metal mold, and they were also infringing. They were pleased to use my rubber molds today, and pay royalty on it.

Q. Now, in this Untermeyer license to which I have just
317 referred there was a specific provision that there would be no payment of royalty on the casting of gold in metal mold, is that correct? A. If they used the metal mold, yes, but they had to pay the royalty on rubber molds.

Q. Now, Morris Kaysen was another licensee, wasn't he, Mr. Jungersen? A. Yes, sir.

Q. Before he became a licensee he had been a defendant in an infringement suit you instituted against him in Philadelphia under the patent in suit; that is correct, isn't it? A. That is right.

Q. Isn't it the fact that before trial of that suit you had commenced negotiations with him for the grant of a license? A. I tried that with everybody.

318 Q. And that litigation was settled. You made no attempt to recover any damages from Mr. Kaysen, did you? A. I don't think so.

Q. Now, I read you from his testimony on the examination before trial, which I believe you attended. He was asked: "Q. Did you settle the case?" And the answer was "Yes." "Q. And part of that settlement was the taking of this license, Kaysen Exhibit 1, was it not? A. Yes. Q. Did you settle for any back infringement? Did you make any payment for back infringement? A. No." I understand you agree with Mr. Kaysen's testimony on that score.

Mr. D. Cooper: He has already testified to that.

Mr. Groner: Then I take it your statement is a reaffirmation, Mr. Cooper.

Q. Now, in connection with that same testimony, I also understand that you and Mr. Kaysen are agreed on this: Mr. Kaysen at page 45, said, in answer to this question:

"Q. What was the result of this first meeting with Mr. Jungersen? Did you take a license? A. I believe we took a license after the suit.

"Q. Did you have any understanding with respect to 320
a license at that time? A. Well, my son was the one that he told him how to do the casting and he did all the transaction.

"Q. That was prior to suit? A. Before and after, the whole transaction was done by my son."

Now, is that a satisfactory statement of the facts? A. I do not think it is satisfactory but we had talked long before about taking—that he should buy a license, and we talked about it after, and it was first after the suit that they took the license.

Mr. Groner: That is all.

Mr. D. Cooper: There is a question I want to 321
ask.

Re-direct Examination by Mr. D. Cooper:

Q. You were asked about your contacting Mr. Baden in 1936, and that no notice was sent him until 1943. I want to ask you, did you know what Baden was doing or that he was doing anything in infringement of your patent prior to 1943? A. No, I did not know or had never seen what he was doing.

Mr. D. Cooper: That is all.

Mr. Groner: May I ask one further question?

The Court: You may.

Re-cross Examination by Mr. Groner:

Q. Did you not testify in your examination before trial that you were able to tell by looking at the product whether the product had been made according to your method or not? A. In general, yes.

Q. And you knew that Mr. Baden was in business during all this period, did you not? A. Yes, but I never examined his rings.

Q. They were always there had you tried to, were they not?

Mr. D. Cooper: Always where?

Mr. Groner: Susceptible of examination at the manufacturing place of business of Baden & Foss in New York City.

A. No, sir. I have never yet seen anybody who wanted to show me anything if we did not have an agreement between us.

Q. And you could not have bought a Baden & Foss ring during this seven or eight-year period? A. That is possible, but I did not.

Q. You did not do so? A. No.

Mr. Groner: That is all.

(Witness excused.)

Mr. D. Cooper: Will you take the stand, please, Mr. Debler?

Plaintiff's Witness, Edmund Debler, Direct 325

EDMUND DEBLER, a witness called on behalf of the plaintiff, being first duly sworn, testified as follows:

Direct Examination by Mr. D. Cooper:

Q. Where do you live, Mr. Debler? A. 104-03 196th Street, Hollis, Long Island.

Q. You are a citizen of the United States? A. That is right. That is correct.

Q. And you were born in Germany? A. That is right.

Q. For how long did you live in Germany? A. For how long?

Q. Yes. A. Well, I came to this country in 1926. 326

Q. And you are now an American citizen? A. Since 1934.

Q. What is your present occupation? A. A factory manager in jewelry.

Q. What concern? A. J. R. Wood & Son, one of the largest and the oldest in the country.

Q. Where is their place of business? A. 216 East 45th Street.

Q. What are they the largest and oldest manufacturers of? What do they make? A. Mostly rings.

Q. Jewelry? A. That is right.

Q. Are you by trade a jeweler? A. That is right, that 327 is correct.

Q. Did you learn in this country— A. No, on the other side. Four years' apprenticeship and six years in the art school.

Q. In Germany? A. That is right.

Q. And for how long did you practice the jewelry trade? A. For the last 37 years, since 1909.

Q. Did you make rings there? A. That is right.

Q. How did you make them in Germany? A. Well, there is a lot of hand-made and there is partly hand-made, tool-made, and there was casting. I will say this, sand-cast, not centrifugal cast.

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Q. By tool-made you mean made with dies? A. That is correct.

Q. That is stamped out by previous manufacture of a die? A. Well, the die was made in our own factory and a part of them hand, half skilled and half production.

Q. Were the dies expensive? A. Yes. Some of the dies—it all depends on the design—maybe they cost as much as a thousand, $1,500; they may be as cheap as $250 or even less.

Q. Whereabouts in Germany was your business located? A. Schwaebisch Gmuend. That is near Stuttgart.

329 Q. When you came to this country with whom did you associate yourself first? A. First with the firm Harry Kahn.

Q. What did they make? A. Hand-made jewelry. They made the finest of jewelry.

Q. What did you do for them? A. Well, I used to do the designing and making the jewelry for them.

Q. How long did you stay with Kahn? A. Oh, I guess eight years.

Q. That would take you to 1934? A. 1934, that is correct.

Q. And since 1934 you had been with J. R. Wood &
330 Company? A. That is correct.

Q. Well, how did you start to make rings with J. R. Wood & Company? A. Well, the time when I came to J. R. Wood they had hand-made jewelry, they had die work, and they had the sand casting too.

Q. By hand-made jewelry you mean where an artisan engraves each individual ring? A. Well, put it this way: A man who makes a piece of jewelry from a design.

Q. And makes it by hand from the design? A. That is right, correct.

Q. Well, how much did J. R. Wood & Company do on sand casting? A. Well, at the time I came to them, quite a lot, because they used to make the class ring, the

graduation ring, which is sold to Johnston in Minnesota.

Q. Did you do any cuttlefish work for J. R. Wood? A. Yes, I did.

Q. How much? A. Well, very little. At the time I learned the jewelry trade the cuttlefish casting was mostly to make a dummy. A dummy is a ring or a part roughly where the jeweler is able with a little filing and engraving and cutting out to make a final piece. In other words, the dummy helps the jeweler maybe 50 per cent in making the next piece, to duplicate it. 332

Q. Well, the first 50 per cent has to be followed by a skilled man, does it? A. Yes, that is right. I should say even after the dummy it needs a skilled man to make the final pattern.

Q. Yes. Well, the cuttlefish type has already been described, and I won't go into that question, but I will ask you what type of workmen you had to finish up the cuttlefish type of ring. A. Well, I would call them model maker, the highest type of jeweler or the best paid jeweler.

Q. Now, did there come a time when you began to use the Jungersen process? A. That is correct. I guess it was in 1937. 333

Q. Jungersen came to your plant and disclosed it to you? A. Well, he came and he showed me some casting in platinum and gold. He undercut and with piercing, very difficult piercing.

Q. Did it make an impression on your mind? A. Definite.

Q. At first, he only showed you the result of his work, the finished casting? A. That is correct.

Q. Well, did J. R. Wood & Company take an interest in it? A. Right away.

Q. And they followed up and took a license? A. That is correct.

Q. And from 1937 on you have been licensed by Jungersen? A. That is correct.

Q. Now, what class of labor do you employ to operate under the Jungersen method? A. Well, I guess you are not asking as far as the jewelry is concerned; I guess you are asking as far as the casting department itself. Is that the question?

Q. Well, I want to know what class of labor. A. Let me say this, you need a highly skilled man to make the pattern.

335 Q. Yes. A. After you have the pattern, you need a fairly good man to make the mold; and after the mold, you only need cheap help, girls to do the waxing, investing and the casting.

Q. And that is all cheap labor? A. I would say so, yes.

Q. After J. R. Wood & Company adopted the Jungersen practice, did others adopt it also? A. Who?

Q. After Mr. Jungersen's procedure was adopted by your company, what became of the sand casting? A. Well, we throw them out right away.

Q. And the cuttlefish? A. Well, partly today—well, you see, the cuttlefish never amounted to anything in pro-
336 duction. You see, it is two different castings, cuttlefish and sand casting, because sand casting is a production method; cuttlefish I would say now—some jewelers use it for production too—

Q. I mean in J. R. Wood & Company. A. Maybe once or twice a year we use them to make a dummy.

Q. Can you give an idea of the annual output of J. R. Wood & Company of these rings made with the Jungersen process? A. Well, I could not give it for last year; I could only repeat for two years ago, because we used to keep a record, but after we paid the licensor up we did not keep a special record any more, but two years ago

it was about $2,000 a year, and about five cents a ring it would be about 40,000 units.

The Court: When you say five cents a ring, you mean the license royalty was five cents a ring?

The Witness: Yes.

Q. So you were making about 40,000 a year the last time you kept track, according to the Jungersen process? A. Yes, that is correct.

The Court: What do you mean, you no longer have to pay? 338

The Witness: We paid it up. We made a final payment and paid it up.

The Court: I see. You got a permanent license without any royalties?

The Witness: Yes.

Q. How long does it take to make a ring under the Jungersen process after you have the pattern made? A. You mean after the mold is made?

Q. Well, start with the pattern. A. Well, I should say about two or three hours to make the mold.

Q. Yes. And then after that? A. After the mold, then you can cast them in seven hours. 339

By the Court:

Q. Seven hours? A. Yes. You see, the wax takes only a few seconds to make.

Q. You say it takes seven hours to make a ring? A. You see, what happened, your Honor, was this: The wax has to be made and that takes a couple of minutes, and then we have to set them up and invest them, and this has to dry, naturally. You have it laying maybe for six hours.

340 *Plaintiff's Witness, Edmund Debler, Cross*

By Mr. D. Cooper:

Q. Do you know of any other process in jewelry manufacturing in which the wax is lost; that is, the wax pattern is melted out of the permanent mold? A. No.

Q. With all your knowledge of sand casting and die making and cuttlefish casting, did that suggest the Jungersen process to your mind? A. No, never.

Q. How does your practice now compare with your practice when Jungersen first taught you? A. I say the same.

341 Mr. D. Cooper: All right.

Cross Examination by Mr. Groner:

Q. Have you any knowledge, Mr. Debler, of casting as practiced in any of the other arts, dentistry? A. I would say yes. I guess you refer to sculpture—

Q. I was coming to that. A. Well, all right.

Q. Let us, just to keep straight, get this: Have you any knowledge of casting as applied in the dental business? A. Well, I should say very little.

Q. Now, you say you do know something about sculp-
342 ture casting? A. That is correct.

Q. Do you mind describing what you know? A. Well, you see, in sculpturing they make a female or positive or male or female in plaster of paris and—

Q. I am completely confused—

Mr. D. Cooper: Let him finish.

A. —on all kinds of material, and there are two ways of doing; they used to call this flush casting. In other words, you take a high content material where you have a lot of lead and put this into the form and hold them for one or two minutes, it all depends on how heavy you want the wall, and pour it out again, this creating the shell of the whole ornament.

Q. Now, let me see if I understand you there. In so far as you understand sculpture casting, you make a mold of your ultimate sculpture? A. Yes.

Q. Then you pour molten metal in it and flush it around and pour it back out again? A. Yes.

Q. So that you have only a shell instead of a solid model, is that correct? A. I guess so.

Q. And is that the extent of your knowledge of the casting of sculpture? A. Let us see, you can do it the other way, where you take the—your Honor, you will excuse me, because the same happens there what we 344
did 30 years ago—

The Court: The question is whether you know something about sculpture, and you said yes—

The Witness: Well, at the time I went to the art school.

Q. What did they do? A. Well, they made a female and a male and put a dividing—

Q. Let me break this down so we can understand it as we go along. By the female and male you mean the mold and the pattern inside the mold, don't you? A. We used to make a plastic model—not plastic, plastoline model.

Q. A plastoline model? A. Yes, and then we put a 345
dividing line, one part we made a male and the other one we made a female part, and then you took the mold apart and took the plastic model out—

Q. Let me see if I understand you—

Mr. Groner: If your Honor understands—

The Court: Not I.

Mr. Groner (continuing): I will not labor this.

Q. Now, let me see, Mr. Debler. You take your plastoline model? A. Yes.

Q. That is the pattern which is going to be your statue after several more operations. Then you make a mold around it? A. That is right.

346 *Plaintiff's Witness, Edmund Debler, Cross*

Q. Now, you take the plastoline model out of the mold and then what do you do? A. Then we have the same condition as any other mold, whether it is a rubber mold or a steel mold; you have a cavity in there with a dividing line, and you put your molten metal in there and have it in there for a minute or two minutes and pour them out. Now, when you let them in for five minutes, you have a solid piece. When you flush them out after a minute or two you got maybe a millimeter heavy shell in there. Then you take the two parts apart—

347 Q. You mean the two parts of the mold? A. Yes.

Q. And that is all? A. Yes.

The Court: That is the way you make an ordinary clay dish, isn't it?

The Witness: Well, it is just like children making the soldier, the only thing, the cavity is much larger and you pour them out again until you get a hollow pattern in there.

Q. Is that all you know about the casting of sculpture? A. About.

Q. And do you know anything about industrial casting? A. I think so.

348 Q. Well, do you know about that phase of industrial casting which takes a die and by pressure die casting makes a wax pattern within the die? A. I know it.

Q. Are you familiar with that? A. Correct.

Q. Now, after you have the pattern you invest it? A. Yes, that is correct.

Q. And after you invest it you burn it out? A. Correct.

Q. And then you cast your final metal into that? A. Yes.

Q. When did you learn of that method, Mr. Debler? A. About three or four years ago.

Q. Just recently? A. About three or four years ago.

Q. Is that in any wise distinguishable from the method you learned from Mr. Jungersen?

Mr. D. Cooper: I will object to that.

The Court: I will allow it.

A. I would say it is the same, the only difference is it is a steel mold instead of a rubber mold, as far as I am concerned.

Q. One further question, Mr. Debler: You spoke of Mr. Jungersen's coming to see you at Wood and showing you some castings? A. Correct. 350

Q. He did not disclose to you the method he used, did he? A. Well, not at the time when I saw the first casting.

Q. And he did not at any time until after the license was made, did he? A. Well, I could not answer you this because I was not the person who talked with him at this time. I guess it was Mr. Schwab or Mr. Wood who did it.

JACOB H. SCHAEFFER, a witness called in behalf of the plaintiff, being duly sworn, testified as follows: 351

Direct Examination by Mr. D. Cooper:

Q. Where do you live, Mr. Schaeffer? A. 41 Eastern Parkway, Brooklyn, N. Y.

Q. What is your business location? A. Jewelry making.

Q. Where is it located? A. 234 West 39th Street.

Q. Are you by practice and profession a jeweler? A. Yes, sir.

Q. How long? A. I have been in the trade upward of 46 years.

Q. Is there an association known as Jewelers Craft Association? A. Yes, sir.

352 *Plaintiff's Witness, Jacob H. Schaeffer; Direct.*

Q. Explain what it is, please. A. An association of mostly all the manufacturing jewelers in the City of New York.

Q. Have you held a position in that? A. Yes.

Q. What? A. I was president for quite a number of years.

Q. Are you still an officer? A. Yes, sir.

Q. What? A. Secretary and treasurer.

Q. Now, what is the name of your firm? A. Shiman Brothers & Company, Inc.

353 Q. And what is its business? A. Diamond ring making.

Q. How long has your firm been in that business? A. About 50 years.

Q. And how long have you been connected with that firm? A. A little over 40 years.

Q. And had you learned the business before you went to the firm? A. Yes, sir.

Q. How do you make your rings now, Mr Schaeffer? A. I would say about 98 or 99 per cent centrifugal casting, the Jungersen method.

Q. You are a licensee under the Jungersen patent? A. Yes, sir.

354 Q. You spoke about that being about 98 or 99 per cent. What is the rest? A. Oh, a few per cent of some numbers that we have had running for a great many years, and it does not pay to make it under any other method. We still die stamp them.

Q. That is where you have the old dies which have been used for many years and you still make a few with them? A. Correct.

Q. Do you remember when you took the license from Mr. Jungersen? A. No, not exactly. I believe it was perhaps eight years ago or maybe a little longer.

Q. How did you make your rings before Mr. Jungersen's practice was installed? A. Mostly die.

Q. Why did you go to the Jungersen method? A. You could get a better product and make a great deal of merchandise that you could not make with the die and tool method.

Q. Did you see Jungersen's process before you signed up the license? A. Yes, sir.

Q. How much does a die cost such as you still use occasionally? A. We only use the cheaper forms of dies that we still carry forward. Formerly with a good set of tools that would make the same or some of the same merchandise that we manufacture today, it would cost 356
anywhere from five hundred to upward of $1,500 or more.

Q. What is the expense of making a ring by the Jungersen process? A. Do you mean, Counselor, making the model as against the die, or making the ring as against the die-made ring?

Q. Let us start with the model. How much does the model cost? A. From $25 to about $75, depending on the style.

Q. And from the time that your model is made what does the Jungersen process cost? A. Just a few dollars.

Q. What was your average expense per year in making 357
the dies before the Jungersen process came in? A. Anywhere between 30 and 40 thousand a year, depending upon how busy we were.

Q. Did you make any by the cuttlefish process before Jungersen came? A. Yes, sir.

Q. Do you do any now? A. No, sir.

Q. Are there models that you use today for your rings that could not be used in the die process? Are they too elaborate, or what is the reason? A. Too intricate, and it would not pay economically to attempt to spend that money for a set of tools.

Q. After the ring has been cast by the Jungersen

358 *Plaintiff's Witness, Jacob H. Schaeffer, Cross*

process what is required to finish it? A. Depending on the ring, Counselor. Some require very little and some require a moderate amount of labor.

Q. What class of labor? A. Well, if you are comparing it with the way we used to make rings formerly, I would say we don't know, and with the skilled labor that we used to have when we made either cuttlebone or die casting, or hand-made jewelry—

Q. Well, what is necessary to finish up a Jungersen ring after it comes out of the casting? A. Very little
359 labor is used today to finish a ring by the jeweler.

The Court: Do you clean it, polish it, scrape it, or do you have to ream any of it?

The Witness: Your Honor, the polishing after the jeweler is through, from there on the polishing and finishing is about the same as it was before we used the Jungersen method, but as to the making of the ring, we have done away with a stamping room; we have done away with a tool room, and we have now bench labor, and we can get out a much better product under this present method of work.

Q. The contrast that you made in answer to his Honor's
360 question was between the Jungersen method and the die method? A. And the die or the cuttlebone method.

Mr. D. Cooper: Yes. You may examine.

Cross Examination by Mr. Groner:

Q. Mr. Schaeffer, are you acquainted with casting as performed in other arts than jewelry manufacture? A. No, Counselor, only this fact: That during our war effort we had some intricate vein propeller assemblies that we used on the oxygen tanks in airplanes, and we were given that to make by some Government agency, and we used the Jungersen method to make quite a number of them.

Q. What type of molds did you use? A. Rubber.

Q. And what type of injecting did you use? A. Centrifugal.

Q. You never used anything but rubber and centrifugal, is that correct? A. We tried to use the other method, but we could not. That is, we tried to use other methods of casting. We did not try other molds.

Q. You have testified that you saw the Jungersen process before signing up. That is, signing up the license which you subsequently took? A. Yes.

Q. Will you explain what you mean by that? A. I believe one of his agents, Sigmund Cohen, whom we were very well acquainted with, came up and told us about it. 362

Q. Did he show you the products? A. Yes, sir.

Q. Did he tell you the method employed? A. Yes, sir.

Q. Could you outline what he told you? A. He told us that you would have to make a model and then vulcanize the rubber mold on the model, and then to centrifugally pour wax into the rubber mold, and you would take the wax out and invest it, and then you would burn the wax out of the investing and centrifugally cast gold or other metals in the opening, break out the investing, and you have a practically finished product.

Q. And that was prior to the time you took your license? A. Yes, sir. Not only that, Counselor, but he asked me, because he knew me so well, that if I promised not to use the method, and he showed me some of the work, and would I be willing to go into it. 363

I said, "Most certainly," and he gave me a demonstration I believe in his laboratory.

Mr. D. Cooper: That is the plaintiff's case, if your Honor please.

The Court: All right. Plaintiff rests.

Mr. Groner: May it please your Honor, I should like to introduce as Defendants' Exhibit C a cer-

364 *Colloquy*

tified copy of the file history of the Jungersen patent in suit.

The Court: No objection. It will be received.

(Marked Defendants' Exhibit C.)

Mr. Groner: Now, I offer as Defendants' Exhibit D that part of the transcript in the New Jersey case which relates to the depositions, which depositions have by stipulation been made admissible in this case.

The Court: All right. It will be received and marked Defendants' Exhibit D.

365 (Marked Defendants' Exhibit D.)

Mr. Groner: If it please your Honor, I should like to offer as Defendants' Exhibits E and F two flasks heretofore introduced in connection with the Austenal prior use and known as Plaintiff's Exhibits P-11 and P-11-A, respectively. They are the flasks in which rubber molds have been made.

The Court: Exhibits E and F will be received in evidence.

(Marked Defendants' Exhibits E and F.)

Mr. Groner: I offer in evidence a denture hitherto known as Plaintiff's Exhibit P-8, and I should like to offer it now as Defendants' Exhibit G.

366 (Marked Defendants' Exhibit G.)

Mr. Whittredge: May it please the Court, all of the intervenors have practiced generally the same broad process, starting with a model, making a model, making a primary mold, getting a wax pattern from the primary mold, from the wax pattern making a secondary mold and casting the precious metal into the secondary mold, thereby getting the precious metal replica.

They have varied the types of primary molds, and they have varied the manner in which they injected the wax into the primary mold.

Axel Bros., Inc., has used rubber and metal molds. They have used to inject the wax a syringe, an air injection machine and centrifugal pressure.

The firm known as Joseph Berland has used rubber molds and metal molds. They have used a syringe and centrifugal pressure to cast the wax.

A. Blumstein, Inc., has used rubber and metal molds, and to cast the wax has used a syringe, an air injection machine and centrifugal pressure.

The firm known as The Cohan Company has used only rubber molds and only a centrifugal casting machine for wax injection. 368

The Feature Ring Company has used rubber and metal molds, and has used a syringe, air injection and centrifugal force for casting the wax.

The firm of J. & H. Flyer has used rubber and metal molds, and a syringe and centrifugal machine to cast the wax.

The firm of Klebanoff & Grossman have used both rubber and metal molds, and both a syringe and a centrifugal machine for casting the wax pattern.

O. M. Resen, Inc., has used both rubber and metal molds, and has used for casting its wax pattern a syringe, air injection and centrifugal machine. 369

Harry Rosenberg Co., Inc., has used only the rubber mold and only the centrifugal machine.

Rothman & Schneider, Inc., have used both rubber and metal molds, and for casting their wax pattern a bulb air pressure gun, air injection and centrifugal machine.

Witkin Precision Casting have used both rubber and metal molds, and have used a syringe and an air injection machine, and a centrifugal machine and a vacuum machine for casting its waxes.

370 *Colloquy*

Model Ring has used only a rubber mold and only a centrifugal wax casting maching.

The last one, Skalet Manufacturing Co., Inc., has used both rubber and metal molds, and has used for its wax pattern a syringe and air injection machine, and a centrifugal machine.

That completes the list of all of the intervenors and their variants of the general method of wax casting.

The Court: Is there any objection to that form of proof?

371 Mr. D. Cooper: Do they all make jewelry?

Mr. Whittredge: Yes.

Mr. D. Cooper: We have no objection to that.

The Court: Very well. I will admit that.

Mr. Groner: Now, may it please your Honor, as Defendants' Exhibit D, a part of the record of the New Jersey case was introduced. It relates to two asserted prior uses; one generally designated as the Slatis use and the second as the Austenal Laboratory's use.

I do not believe the Slatis use is of sufficient importance to justify it being read to your Honor. In the New Jersey case I think it is fair to state
372 that Judge Meany held that it was a secret use, and for that reason I believe justifiably disqualified it. It is in this record for purely collateral reference.

The method used by Austenal was not entirely successful, and after a year or so it was discarded in favor of another and better method of casting. However, I reiterate it was used and commercially used for about a year.

The Court: You have not a replica of the wax pattern produced by the Austenal method.

Mr. Groner: I have, if it please your Honor, but it is not in evidence. It is contemporary with the

testimony which is 1943; it was made at that time, but can simply be used here to illustrate what the wax patterns are like.

I should like to offer this, if it please your Honor, as Defendants' Exhibit H for the very limited purpose I have mentioned.

Mr. D. Cooper: For the purpose of illustrating what you say is in the deposition?

Mr. Groner: That is exactly right, sir.

Mr. D. Cooper: No objection.

(Marked Defendants' Exhibit H.) 374

ROBERT BADEN, called as a witness on behalf of the defendants, being duly sworn, testified as follows:

Direct Examination by Mr. Whittredge:

Q. Mr. Baden, will you state your name, age and address? A. Yes. Robert Baden, age 58.

Q. And your occupation? A. I am doing nothing right now.

Q. You are temporarily retired? A. Yes.

Q. What was your occupation? A. Until 1945 I was a 375
manufacturer of gold jewelry.

Q. With what firm? A. Baden & Foss.

Q. And you were a partner in that firm? A. That is right.

Q. And in 1945 what happened? A. We sold out.

Q. Since then you have not engaged in any business? A. I have not engaged in any business since then.

Q. What type of jewelry did Baden & Foss manufacture? A. Gold jewelry, consisting of men's rings and ladies' rings.

Q. And how did you manufacture those rings? A. Well, we had various ways of making them.

Q. What were they? A. Like cuttlebone, sand casting, stamping the work out of dies, and some centrifugal casting.

Q. Will you just outline the general steps in that centrifugal casting method? A. Well, we used about 90 per cent or 95 per cent metal molds, and about 10 per cent rubber molds.

Q. And the remainder rubber molds? A. That is right.

Q. How did you obtain the molds? A. From an original model? A. That is right. We made the original model first and then cast some metal around it, left the impression on the model; and afterwards we put in some wax and used either an eye dropper, a syringe or pressure, hydraulic or centrifugal.

377

Q. And by pressure you mean what? A. Air pressure.

Q. An air pressure machine? A. That is right.

Q. And you made the rubber molds in what manner? A. The regular manner. Just put a mold in the model, then put the two pieces of rubber around it and vulcanized it.

Q. And what was the purpose of the different means of introducing the wax under pressure into either the rubber or the metal molds? A. Well, certain rings require less pressure, which means that you could use an eye dropper, which would be enough, or a syringe.

378

Q. Why did you use any pressure at all? Why didn't you just pour the wax? A. Whatever we used which would give us the better results, that was the method we used.

Q. Sometimes you used a hydraulic machine? A. Yes, anything at all.

Q. And sometimes you used air pressure? A. Yes.

Q. Depending on the nature of the results? A. Yes; whatever produced the better results we used that.

Q. Is there any substantial difference in the various methods of pressure casting of the wax pattern? A. Not at all; no difference at all. They are all alike.

Q. I now show you four rings, each with a tag on it, with numbers from 1 to 4, and ask you if you can identify those? A. Yes, sir. They are gold rings made in our factory previous to 1945. 379

Q. And what were they manufactured for? A. For the purpose of showing how they are made. Two rings are made in cuttlebone and two rings in centrifugal casting. And you can't tell the difference as to which is which.

Q. Have you examined these to see if you can tell the difference? A. I have examined them very carefully, and there is nothing shown here which shows which is which.

Q. They are identical rings? A. Identical rings, made by the same jeweler, set by the same setter and under my supervision, and still I can't distinguish which is which. 380

Q. Of course two of these rings have stones? A. Yes.

Q. Black stones? A. Yes.

Q. And two seem to have lost their stones? A. Yes, and I don't know why.

Q. But the rings themselves— A. Are the same.

Q. Apart from the stones are exactly the same? A. Yes.

Q. Have you seen these rings since they were manufactured for the purpose of demonstration? A. Yes, I did. 381

Q. When? A. Here recently.

Q. But that was only a week or so ago? A. That is right.

Q. And you have not seen them since they were manufactured? A. No, and I don't know where they were.

Mr. Whittredge: I introduce these rings in evidence.

(Marked Defendants' Exhibit 1.)

The Court: Did it cost much less to make these centrifugal rings than it did the cuttlebone rings?

382 *Defendants' Witness, Robert Baden, Direct*

The Witness: Yes.
The Court: It cost less?
The Witness: Yes.

Q. And the results were the same? A. The same results.

Q. There has been some testimony about Mr. Jungersen visiting your place of business? A. Yes.

Q. When did you first meet Mr. Jungersen? A. The first time I met Mr. Jungersen was the latter part of 1936.

383 Q. And what happened at that meeting? A. He came around with a man by the name of Mr. Walsh from Canada, one of our customers, who brought him over, and he showed me a bunch of rings, and I was not interested. It was before Christmas and we were too busy and I disregarded it.

Q. You told Mr. Jungersen you were not interested? A. That is right.

Q. Why? A. We were too busy then to bother with it.

Q. Were you at that time using a casting process? A. Yes.

Q. The casting process you are just describing? A. That is right.

384 Q. Did Mr. Jungersen do anything but show you these rings? A. Nothing but show them.

Q. He did not disclose to you the process? A. No. He did not speak with me for more than five minutes.

The Court: Wait a minute. You say at that time you used a casting?
The Witness: Yes; metal mold.
The Court: Did you use a centrifuge process?
The Witness: Yes.
The Court: When did you begin to use that?
The Witness: In the middle part of 1936.

Q. Did you ever meet Mr. Jungersen again? A. Yes, about a year, two years after.

Q. What happened at that time? A. I did not speak much to him at all. He did not speak much to me at all.

Q. What was the purpose of his coming to your place of business? A. I don't know why. I did not ask him why.

Q. But did you at any time agree to take a license from Mr. Jungersen? A. Never did.

Q. Did he ever leave a contract with you? A. He might have left one. I would not know.

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Q. Do you recall whether Mr. Shaw was with Mr. Jungersen at any of these meetings? A. I would not recall whether he was there or not.

Q. Did Mr. Jungersen ever disclose to you any part of his process? A. Never did.

(Witness excused.)

Mr. Whittredge: I will now call Mr. Schneider.

GEORGE SCHNEIDER, called as a witness on behalf of the defendants, being duly sworn, testified as follows:

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Direct Examination by Mr. Whittredge:

Q. Mr. Schneider, will you state your name, age and address? A. George Schneider; age, 23; 1475 Sheridan Avenue, Bronx, New York City.

Q. And your occupation? A. I am a caster.

Q. Employed by whom? A. Axel Brothers.

Q. And at what address? A. 64 West 48th Street.

Q. When did you begin working for Axel Brothers? A. I was first employed by Mr. Axel in March of 1942. I was inducted into the service in January, 1943, discharged in 1945, December, and rehired in 1946, in January.

388 *Defendants' Witness, George Schneider, Direct*

Q. What was your job when you first went with Axel Brothers? A. I was hired as an apprentice caster.

Q. And you have progressed to the job of caster? A. Progressed to supervisor of the department.

Q. What are the duties of a caster? A. Well, start originally making the model, or we make the model or the mold from a wax pattern, invest this wax pattern, eliminate the unnecessary parts, and actually cast it.

Q. And you have done this general type of work both as an apprentice and as a regular caster during all the time you have worked for Axel Brothers? A. Correct.

389 Q. What type of molds have you used for casting the wax patterns? A. Both rubber and metal.

Q. And do you still use both types? A. We do.

By the Court:

Q. What determines whether you use a rubber or a metal mold? A. Well, sir, it seems to be up to the employer. Some favor metal and some favor rubber.

Q. It is not because you intend to make many or a few? A. No, sir.

Q. That has nothing to do with it? A. No, sir. It is up to the employer.

390 Q. You are yourself not aware of any advantage in one process over the other? A. No, sir.

By Mr. Whittredge:

Q. It is a matter of personal preference with the employer, you say? A. That is right.

By the Court:

Q. All other stages of the process are identical? A. That is right.

Q. It is simply a question of what material you make your primary mold with? A. That is correct.

Q. And what kind of metal do you use in a primary

mold when you use metal? A. Well, sir; I don't know the technical name for it. It is soft metal. It is some sort of an alloy.

By Mr. Whittredge:

Q. I show you a rectangular object of metal and ask you what that is? A. This is one of our metal molds.

Q. I show you a rectangular object of rubber and ask you what that is? A. This is a rubber mold, exactly the same model.

Mr. Whittredge: I offer as Exhibit J the rubber mold and Exhibit K will be the metal mold. 392

(Marked Defendants' Exhibits J and K.)

The Court: Has this model J been actually used already?

The Witness: Oh, yes; it is from regular production.

The Court: This mold, Exhibit K, is from regular production?

The Witness: Yes, sir.

Mr. Whittredge: The metal mold, your Honor, is not regular production. It was made up specially from the same model ring as the production rubber mold was made from. 393

Q. For a metal or a rubber mold, the next step then, as I understand it, is to inject wax into either of those molds and obtain a wax pattern? A. That is correct.

Q. And you use several variants to do that wax casting? A. Yes.

Q. What are those variants? A. We use there three that we have worked with.

Q. What are those? A. We use the syringe, injector machine, and centrifugal machine.

Q. By "injector machine" you mean air pressure? A. That is right.

394 *Defendants' Witness, George Schneider, Direct*

Q. And do you have one of the syringes with you? A. I do.

Q. Will you produce that? A. Yes.

Q. Will you describe it? A. This syringe is taken from a wax mold. It is heated and there is forced out the air, and the molten wax is turned into a tube.

The Court: It operates like an ordinary syringe?

The Witness: Yes, or a big eye dropper.

Mr. Whittredge: That is all it is.

395 By the Court:

Q. How do you decide whether to use a syringe, an air pressure machine, or centrifuge? A. Well, sir; there is no special way to decide. It is a matter of deduction.

Q. Well, if you were going to make a few, what method would you use? A. If I were going to make a few I would use the syringe.

Q. And if you were going to make many? A. I would use the centrifuge, or the injector machine.

Q. Because of the greater speed of operation? A. Yes.

By Mr. Whittredge:

396 Q. And the syringe is the cheapest method? A. That is correct, that is the cheapest.

Mr. Whittredge: I introduce this syringe in evidence as Defendants' Exhibit L.

(Marked Defendants' Exhibit L.)

Q. Will you describe briefly the operation of a centrifugal wax casting machine? A. It is nothing but an arm revolved by motor, and you place the mold on this arm and you form the molten wax into a crucible, and you open the gate of the mold by revolving the machine and the wax is squirted into the mold making the wax pattern.

Q. Will you describe the operation of the air pressure injection machine? A. It is worked on the same principle as the ordinary eye dropper, or the syringe, but only we introduce compressed air into the machine, forcing our wax out into the metal or the rubber mold.

Q. It consists of the wax pot? A. Yes.

Q. And the mold is pressed against the nozzle? A. That is right, and the air comes out, and it forces the wax into our mold.

The Court: You do not have any trouble with the air getting into the mold as a result of the air pressure ma- 398
chine?

The Witness: We do, but we have to make some allowances for that.

The Court: What do you mean by allowances?

The Witness: We make escapes for the certain types of rings, so that there is a trap for the air, and certain type pieces we cut.

The Court: So that the air escapes?

The Witness: That is right.

Q. Now, those vents are cut in the mold? A. That is correct.

Q. So as to void the air as the wax comes in? A. That 399
is correct.

Q. Have you had experience with all three methods of wax casting? A. Yes.

Q. And they are still being used? A. They are still being used today.

Q. I hand you two small metal objects sprouting nine rings sprued up on a base, and ask you if you can identify those? A. These were made by me. The entire operation was supervised by myself. There are nine rings on each button.

Q. What do you call each object? A. Rings. They are a flask of rings.

400 *Defendants' Witness, George Schneider, Direct*

Q. A flask of rings? A. A flask of rings, and there are nine made from rubber and nine made from metal.

Q. You mean one button was made or one flask was made? A. Yes, a metal mold.

Q. The wax was made into a metal mold? A. Yes.

Q. One flask was made from waxes which were cast in a rubber mold, is that right? A. That is right.

Q. And what method of wax casting was used to make the waxes in each case? A. We used for the first three a syringe, the following three centrifugal, and the last three the injector machine, making a total of nine rings.

401 on each button.

Q. Can you tell by an inspection of those buttons or flasks which of the rings were made by the injector process and which of the rings were made from waxes, which were cast by centrifugal machine and which from waxes cast by the syringe method? A. There is not any difference whatsoever.

Q. Can you tell by an inspection of the two flasks which of them came from waxes made in the rubber mold and which from waxes made in the metal mold? A. Not from the rings themselves, but from the mark on them.

Q. That is, you have a mark, an identifying mark on

402 the base of each flask? A. That is correct. That is correct, corresponding with our marks on our molds.

Q. The molds which have just been introduced in evidence? A. That is right.

Q. I find on the base of one of those flasks the number 1 stamped into the metal, and on the cover of Defendants' Exhibit K the metal mold the number 1 stamped on the metal. A. Yes.

Q. Does that indicate to you that the flask of rings marked 1 came from waxes which were cast in the metal mold? A. That is correct, and came from No. 1.

Mr. Whittredge: I introduce the flask of rings stamped No. 1 as Defendants' Exhibit M.

(Marked Defendants' Exhibit M.)

Q. The other flask of rings you say has a No. 2 stamped on its base? A. Yes.

Q. And Defendants' Exhibit J, the rubber mold, has a No. 2 in pencil, and I take it in indelible pencil— A. That is right.

Q. —on one end? A. Yes.

Q. Does that indicate to you that you made the waxes which produced flask No. 2 of rings from the rubber mold No. 2? A. That is right.

Mr. Whittredge: I introduce in evidence the 404
flask of rings stamped No. 2 as Defendants' Exhibit N.

(Marked Defendants' Exhibit N.)

By the Court:

Q. None of these has been polished? A. No, sir; they are not.

Mr. Whittredge: The stamped numbers are a little hard to see, and so they have been supplemented by pencil numbers.

Q. Nor are they in any way treated? A. No, sir.

Q. Have you any personal preference as to whether 405
you would use a rubber or a metal mold? A. I do not, sir.

Q. You get the same degree of precision? A. That is correct.

Q. You do not get a sharper line in your metal one? A. A sharper line? It would not make any difference. In rubber or metal it does not make any difference.

The Court: All right. Proceed.

By Mr. Whittredge:

Q. All of the rings on both flasks are, so far as you can determine by looking at them, the same thing? A. Yes.

406 *Defendants' Witness, George Schneider, Cross*

Q. As articles of commerce? A. Yes.

Q. Both equally well defined? A. Yes, sir.

Q. And both come, of course, from the same original model? A. Yes.

Q. All of the rings and both flasks would take the same amount of polishing to finish them off before actual sale as finished articles of jewelry? A. That is right.

Mr. Whittredge; Cross examine.

Cross Examination by Mr. Flocks:

407

Q. Mr. Schneider, I have here Defendants' Exhibit J, which appears to be a rubber mold. I ask you, did you make it? A. No, sir.

Q. I did not hear your answer. A. No, sir. I supervised the making of it.

Q. I now have in my hand what purports to be a metal mold marked Defendants' Exhibit K, and I ask you if you made that hold? A. That one I made.

Q. With regard to the rubber mold, Exhibit J, in how many parts is the mold? A. Well, the mold is vulcanized—

The Court: How many parts is it? Two parts?

The Witness: Two parts.

408

Q. With regard to Exhibit K, in how many parts is the mold? A. Well, we could say two parts.

The Court: Two or three?

The Witness: You call it a two-part mold unless you want to differentiate as to all these pieces.

The Court: Yes. There is another piece.

That is what you wanted? It is a three-piece mold.

Mr. Flocks: Yes, your Honor.

Mr. Whittredge: Or a two-piece mold with an insert.

The Court: That is right, but they constitute three separate pieces.

Mr. Whittredge: That is right.

Q. Now, if it is a two-piece mold with an insert, of what metal is the insert made? A. The insert is made of the same metal as the other metal in here; all made of the same metal.

Q. I hand you that part of Exhibit K which has the label on it as distinguished from other parts which do not have the label identifying it as K, and I ask you how many metals are involved in this piece? A. There is a 410
base which we buy with a cavity in it, as you can see the separating point here (indicating). We take the model, place it in one-half of the cavity which is filled with putty. The other half of the cavity is then inclosed on this model thus (indicating). We melt this metal—I do not know the technical name for it exactly; it is very soft metal—and pour it against the putty. We take off the top, clean out the putty, clean up our model, pour the metal against this metal here with a separator so they do not fuse.

By the Court:

Q. You put a separating sheet between them? A. We happen to use stove polish. Other firms use nail polish, 411
as long as the metals will not fuse.

Q. So as to permit your separation? A. That is right. Therefore we have the two halves. For our button or top part the same operation is followed. We just take out the putty and pour in our metal.

By Mr. Flocks:

Q. Do I understand you to correctly state then that you have in this particular metal mold three parts of this low-temperature metal and each part is made like the other two parts against the model, is that correct? A. That is correct.

412 *Defendants' Witness, ~~George~~ Schneider, Cross*

Q. So you have three parts made of this low-temperature melting metal, is that correct? A. That is correct.

Q. You also have two other metal parts which you described as bases, is that correct? A. That is correct.

Q. So then, in effect, we have the five pieces of metal here, two of which comprise the base and three of which have to do with the low-temperature metal to which you have referred? A. That is correct.

Q. With regard to this low-temperature metal, how do you melt it? A. Melt it over a Bunsen burner.

413 Q. What temperature would melt that? A. I don't know, sir.

Q. Approximately? A. I have no idea. It is done according to smell. That is the way we learned how to do it.

Q. What does that mean? A. By smelling the metal an experienced man could tell when it is ready to pour. If it is too hot it will go through the stove polish or nail polish and fuse to the other metal, in which case we would have to start over again.

Q. In other words, it is very low-temperature metal? A. That is correct.

Q. About 150 degrees Fahrenheit? A. You could say

414 that—no, I beg your pardon, it would be a little higher.

Q. About 175? A. I would say over 200.

Q. About 200? A. Yes.

Q. Less than the boiling point of water, which is 212? A. Well, maybe the same; about the same.

Q. You said that you were in charge or the supervisor of this department, is that correct? A. That is correct.

Q. Do you have to do with the purchase of materials for this department? A. I do.

Q. You requisition? A. That is right.

Q. How do you requisition this metal for the three of the five metal parts to which I referred? A. Well, if I run short of this metal I just go to my employer and say

I have to have the metal, the inside for our cast, and he will get it. I requisition it in that way. I do not know the name of it. He will get it for me.

Q. Have you made other metal molds besides this one? A. Oh, yes.

Q. Are all the metal molds which you make like this one? A. No, sir; this is the latest type.

Q. And do some of them have more than two outer pieces and three inner pieces? A. Yes.

Q. How many pieces do you make in some of the more complicated rings? A. Well, it is up to the ring itself. There is not any set rule. 416

Q. Well, do you have some with five of the soft metal parts? A. Possibly yes. There may be sometimes four or five. Three is the usual amount.

Q. Referring to the number of pieces of which the molds J and K are made, as you have three soft metal parts in the metal mold and two parts in the rubber mold, it follows then that you have less surfaces that you would put together to form the complete mold prior to the introduction of the wax, is that correct? A. For the rubber mold.

Q. In connection with the rubber mold you would have less pieces to put together? A. Yes. 417

Q. Less separate surfaces to contact? A. That is right.

Q. Does it take longer to put three pieces together than two pieces in assembling the mold? A. Not necessarily.

Q. Well, if you have five pieces in a mold, would it take longer? A. No, it would not. Not for an experienced operator.

Q. In other words, with special training, why, you can take five pieces apart as fast as you can take the two apart? A. I would not say special training. It is just a matter of working it out.

418 *Defendants' Witness, George Schneider, Cross*

By the Court:

Q. Is stove or nail polish used to separate the little jigger you have got on the inside, on the other parts? A. On the top part?

Q. No, in the metal mold, you have that little jigger, the removable part. A. Yes.

Q. Do you use stove or nail polish to separate that as well as the others? A. Yes, also made of the low temperature metal.

By Mr. Flocks:

419

Q. I believe you said that this came from regular stock, didn't it, this rubber mold, J? A. That is correct.

Q. You also said that Exhibit K was made specially as an exhibit? A. That is correct.

By the Court:

Q. You know that ring that you produced out of this mold has a hole in the top of the setting? A. They all have, sir. That is for diamonds to be set in there.

Q. Each half of the mold has a little tiny protuberance at the point where that hole would be? A. That is correct.

Q. Now, does that indicate that that little rubber post
420 which makes the hole is split in the middle? A. That is right.

Q. Now, how do you get it to split at that point? A. When you cut the mold—you mean the rubber mold?

Q. Either the rubber or the mold. A. You can see exactly what you are doing. That was vulcanized. Cutting it apart.

Q. You cut it with a knife? A. Oh, yes, with a surgical tool, a scalpel.

Defendants' Witness, George Schneider, Re-direct 421

Redirect Examination by Mr. Whittredge:

Q. You might explain how the rubber mold is vulcanized and then why it is necessary to split the inner core in order to retrieve the model.

By the Court:

Q. How do you do that? A. The original model is made and checked by an examiner or the employer. It is usually made of silver, and then we place the silver model in between those two pieces of rubber, which are vulcanized in a form in order to make it square. We happen to work on this shape, square.

Q. Rectangle. A. That is right. It is vulcanized about a half hour. If you have natural rubber it is a half hour. If you use synthetic rubber, which you can only get now, it is a little longer, 45 minutes. After that you take it out and then drop it in water and cool it and then take it out of the rectangular mold or shape.

Q. That is the frame? A. That is right, and then proceed to cut it down the center. The entire rectangular shape is not vulcanized. As you can see, there is only a small portion vulcanized just around the ring.

Q. The rest is left to cool? A. It is separated right here (indicating). It is very thin so it does not distort. All that is cut is the small area ir here (indicating). 423

Q. So you bend it apart and start cutting? A. Yes, and once you do that you know exactly how to cut.

Q. Does that take skill? A. Oh, yes.

Q. Because you might injure the mold if you do not cut it properly? A. That is correct.

Q. Does it take much training to learn how to cut that? A. It does in order to cut it properly.

The Court: There was a rubber mold introduced by the plaintiff, too, wasn't there?

Mr. Whittredge: Yes, your Honor.

424 *Defendants' Witness, George Schneider, Re-direct*

The Court: I would like to see that.

Mr. Whittredge: It is Plaintiff's Exhibit 3, your Honor (handing).

Q. Now, would you look at Plaintiff's Exhibit 3. The separation there seems as if it was not cut by a knife but as if it came apart naturally. Is that right? A. It would have to be cut by a knife, sir. If it would come apart separately you would never get the wax out of it. By bending it you can see it was cut.

Q. Well, was it cut much more skilfully than Exhibit J?
425 Is that why J looks pretty ragged on the inside? A. No, sir. Let me explain something to you. This was probably made from a metal frame.

Q. You are referring to— A. J. These are actually locks, so our mold is not moved once in the machine.

Q. Yes, I understand that. But the ornament proper— A. No, it was not cut more skilfully than ours. Ours would be much the same if we had this business here, which is unnecessary (indicating). We just have two locks on the outer edge.

Q. Yes, I see that. And you think that serves the purpose? A. Yes.

Q. Is this Exhibit 3 an unusually complicated design, or
426 intricate design? A. I would not say it is out of the ordinary sir.

Q. You think that was made out of—did you say you thought that was made out of a metal mold? A. No, out of a model, the original model.

Q. Out of a model? A. It would have to be made out of a model.

Q. They are all made out of models? A. Oh, yes.

Q. These locking devices, they are part of the sheet of rubber before you start work? A. No, sir.

Q. They are put in as part of the vulcanizing process? A. That is correct.

Defendants' Witness, George Schneider, Re-direct: 427

Q. So that the original model would include those buttons and buttonholes? A. Not the original models, sir.

Q. Or some frame that is put in there? A. Yes. At one time we used aluminum sheet with those holes stamped in there, and a rubber vulcanizer on it, and we found it wasn't very satisfactory.

By Mr. Whittredge:

Q. So your method of locking the two halves with the mold is to vulcanize into the top and bottom half these corrugated bits of red rubber? A. Yes.

428

Q. To serve the same purpose as the projections and holes, the matching projections and holes in Plaintiff's Exhibit 3? A. Yes.

By the Court:

Q. Now, there is a knife slit vertically down the center. Is that just to help it get the wax out? A. That is right.

Q. And the two slits that you have alongside the setting area of the ring is for the same purpose? A. That is right.

The Court: All right.

By Mr. Whittredge:

429

Q. Mr. Schneider, you have testified on cross examination that this metal mold, Defendants' Exhibit K, was made specially for exhibit purposes in this case. Is there anything special about the construction of it, the internal construction of it? A. Well, only in one way. This is the most modern way of making metal molds, in order to facilitate, speed up our production. The old way was sort of a round-shaped affair with an added steel plug in the center, which we have eliminated by using this low fuse metal.

Q. But it actually represents— A. Our metal molds.

Q. —a production type of metal mold? A. That is correct.

Q. Nothing queer about it? A. No, sir.

Q. In using metal molds you ordinarily have, as this one has, an insert or maybe two or three inserts so that altogether you have three, four, five pieces; and in a rubber mold you only have the top and bottom half, two pieces? A. That is correct.

Q. But is it not true that in using a rubber mold there are additions which you have to use and manipulate in a casting machine. A. Well, the difference is this: As you saw those knife cuts in the mold, the time I take out two or three of those pieces I would have to spend just as much time pulling out those cuts, those knife cuts. Therefore, in production it is exactly the same. There is not any difference in the amount of work.

Q. And in using a rubber mold, when you put it in the casting machine, do you not have to use a backing plate, top and bottom? A. That is right.

Q. It adds to the complexity of using the rubber mold? A. That is correct.

By the Court:

Q. Let me ask you just one thing: When you are through with the use of a particular model, do you retrieve the backing or do you throw it away? A. I don't understand what you mean by the backing.

Q. Take that metal mold that you used. You started with two metal backs into which you inserted putty on one side? A. Yes.

Q. Supposing you wanted to reject this part; you are not going to make rings of that design any more; do you throw the whole thing away? A. Oh, no. This metal is so soft, we melt it out—

Q. You melt it out and you retrieve the backing and use that again? A. Yes.

Defendants' Witness, George Schneider, Re-cross 433

By Mr. Whittredge:

Q. You testified you did not know what temperature the fusing temperature of this soft internal mold metal was? A. That is correct.

Q. What is the temperature of the wax, the casting temperature of the wax that you cast into this? A. We use our wax about 150 degrees. Other types of wax take more or less.

Mr. Whittredge: That is all.

Re-cross Examination by Mr. Flocks: 434

Q. I have here Exhibit J, which I believe you said was a production rubber mold in your plant. A. Yes.

Q. Is it presently being used? A. It will be used up to this month, I guess. We are making a new line.

Q. How many waxes do you get a day from this mold? A. Well, actually, we do not have one. We cut two or three of the same model. In that way we get about 350 waxes a day. 350 or 300.

Q. Of this number? A. That is correct.

Q. Coming back to Exhibit K, in the manufacture of this low temperature mold, I believe you stated that you started with a model and these casings? A. Correct. 435

Q. And it was between the casings and the surface of the model that you flowed this low temperature fusing metal? A. Also against the putty.

Q. The putty is part of the blocking out material? A. Yes.

Q. So it would only expose the part of the model which is not covered with putty? A. Correct.

Q. So against the exposed part of the model and within the casing you flowed the soft metal; is that correct? A. Yes.

Q. And this soft metal flows and takes the shape in negative of the metal? A. Correct.

436 *Defendants' Witness, George Schneider, Re-cross*

Q. That you desire to reproduce; is that right? A. That is correct.

By the Court:

Q. Does that syringe you showed me handle that soft metal? A. No, sir.

Q. You can't pour it with that? A. To tell you the truth, I never tried it. You just pour it out of a little cup. It does not need any force at all.

By Mr. Flocks:

437 Q. I believe you also stated in production on this mold you used centrifugal force and you would not want to interrupt your production to get the wax in for small quantities; is that correct? A. I do not think I stated centrifugal force. We use all three types. Mainly centrifugal and injection. By injection I mean air pressure machine.

Q. In this particular stock mold what do you use? A. Both. It does not make any difference.

Q. I know, but what are you using? A. Both. Exactly both.

Q. In other words, you have one production line running with centrifugal and another production line running with
438 something else? A. It is not any production line. It is just different machines. Three centrifugal and one injector; and the one injector makes up for the three centrifugals.

Q. I see. You have three centrifugals and one injector? A. Yes, and that one injector makes up for the three centrifugals.

By the Court:

Q. You mean it works as fast? A. That is right.

Q. It is much faster? A. Much faster work, sir. There is no clamping on the rubber mold or metal mold.

Defendants' Witness, Sam Tour, Direct 139

SAM TOUR, called as a witness on behalf of the defendants, being first duly sworn, testified as follows:

Direct Examination by Mr. Groner:

Q. What is your age and what is your residence, Mr. Tour? A. I am 51 years old; I live at 435 West 23rd Street, New York City.

Q. And what is your occupation? A. Consulting metallurgist and metallurgical engineer.

Q. Are you connected with any concern? A. I have my own firm known as Sam Tour & Company, Incorporated. 440

Q. And the business of Sam Tour & Company, Incorporated, is what? A. Engineers, metallurgists and consultants.

Q. And you are a licensed professional engineer in New York? A. I am.

Q. Will you outline your career starting with the time you came out of college? If you have that written down I think his Honor— A. Degree of chemical engineer from the University of Colorado in 1916; a degree of master of science in chemical engineering from the University of Michigan, 1917. Leaving there I was with the Ordnance Department during World War I. From 1917 on through 441
1921 as metallurgist, during the latter part of that being in charge of the metallurgy section of the technical staff of the office of the Chief of Ordnance in Washington. Leaving Government service in 1921, I went with the Doehler Die Casting Company as metallurgist; was with them until 1928.

Q. Suppose you explain what the Doehler Die Casting Company is, Mr. Tour. A. The Doehler Die Casting Company are the world's largest producer of die castings and castings in plaster molds. They have some five different plants in this country producing die castings, in all plants, and in one plant producing castings in plaster mold.

442 *Defendants' Witness, Sam Tour, Direct*

Q. Proceed. You progressed as far as 1928. A. Leaving Doehler Die Casting in 1928, I went into business for myself as an independent consultant for one year, and then joined Lucius Pitkin, Incorporated, of New York City, a firm of consulting chemists and metallurgists; became vice president of that concern in charge of the chemical and metallurgical engineering. I stayed with Lucius Pitkin, Incorporated, until 1943, when I organized Sam Tour & Company, Incorporated, and took over the engineering division and business which I had built up in Lucius Pitkin, Incorporated.

443 Q. Now between 1940 and 1943 did you have any extra curricular activities in connection with your profession? A. Yes, sir. From 1940 until 1943 I was director of the laboratory at Frankfort Arsenal, known as Frankfort Arsenal Ordnance Laboratory.

Q. And what was your work there? A. That laboratory was devoted to research and development work and production control work in connection with the manufacture of small arms ammunition, artillery ammunition, fuses and artillery instruments.

Q. In 1945 did you have any extraordinary experience in connection with your professional work? A. In 1945
444 I went to Germany to investigate metallurgical developments in Germany in connection with the technical industrial intelligence committee of the joint chief of staff which operated under the Foreign Economic Administration.

Q. Do you belong to any technical societies, and have you written articles having to do with various engineering subjects? A. Yes, sir. I belong to the American Foundryman's Association; the American Institute of Mining & Metallurgical Engineers; the Society of Automotive Engineers; The American Institute of Chemical Engineers; the American Society of Testing Materials; the American Society of Metals; the Association of Consulting Chemists and Chemical Engineers.

445

Q. Have you written articles on any subjects having to do with casting or foundry practice, or anything of that nature? A. I have written numerous articles in connection with foundry practice, both die casting, sand casting and other types of casting to the extent of writing a small manual for the industry.

Q. Can you explain broadly what casting is? A. Casting is the general practice of pouring a molten material into a cavity where it will solidify and take the form of that cavity.

Q. Are there different types of casting? A. There are a number of different types of casting, and in each type there are a number of different methods of carrying out the operation.

446

Q. Will you state some of the types of casting and some of the variants within a particular type? A. The ordinary breakdown of types of casting is with respect to what the casting is made in. In other words, what the mold is made of. There we have sand casting, which is broken into sub-classes of green sand, dry sand, baked sand; and so forth.

Then there is the metal mold casting, which is subdivided into gravity casting, slush casting, pressure casting, in metal molds.

447

Then there is the refractory type of mold casting, such as in plaster of Paris or other refractory materials.

In practically every one of these types of casting various methods are used to introduce metal which is generally subdivided into the gravity type where molten metal is poured in by gravity alone, and variances in amount of pressure obtained are obtained by the height of head of the gate so that the static pressure of the molten material can be more or less as required.

Then there is centrifugal casting to introduce the metal into the mold, and there by variants in speed of rotation and distance of rotation of the mold from the center of rotation, the amount of pressure is variable.

448 *Defendants' Witness, Sam Tour, Direct*

Then there is the air pressure type of introducing molten material which is used by forcing the molten material with air on the head or on the top of the molten material and an outlet underneath so that the material coming out of the pot will come out according to the air pressures used. Pressures of air from a few pounds up to 500 or more pounds are used in that fashion. Then there is the plunger or piston method of applying metal where the plunger or piston operates in the bath of molten metal and ejects the metal from a nozzle with force.

449 By the Court:

Q. I want to ask you one question:—In the air pressure method what prevents the flowing metal from entering into the exit that is intended to allow the air to escape? A. The container of molten metal is built something of the order of a teapot, with the molten metal level above the spout for the molten metal to get out and air would be introduced under the cover, so that air introduced there creates a downward pressure within the pot and forces the liquid up out of the spout. Then releasing the pressure at the top just stops the flow of molten metal.

By Mr. Groner:

450 Q. Now, broadly speaking, Mr. Tour, what is the occasion for using any form of pressure in any of these casting operations? A. Broadly speaking, when the founder has difficulty in filling the mold and getting detail he resorts to sufficient pressure to fill out the detail.

Q. How long has that been broadly true, Mr. Tour? A. That is as old as the casting art, which is centuries old.

Q. And how old are these various types of applying pressure to which you have referred? A. Anywhere from 20 to 30 years to centuries.

Q. There has been reference here from time to time to statuary casting or jewelry casting or dental casting:

451

is there any such thing as statuary casting or dental casting or jewelry casting, Mr. Tour? A. They are all casting, and it makes very little difference to a caster whether the final article is going to be a piece of jewelry, a piece of statuary, or the filling for a tooth or denture, or a mechanical part. The size of the casting, the intricacy of the casting, and the material of which it must be cast are the controlling factors, not the end use.

Q. Is there any system having application only to one of these sub-fields and having no application to any of the others? A. No such system that I know of.

452

By the Court:

Q. Well, would you say that in dealing with jewelry casting where I suppose you introduce a degree of refinement which exceeds that of industrial and mechanical fields, that that in itself created problems which are not confronted by the industrial caster? A. Your Honor, I would say just the reverse. Where it is necessary and desirable to apply the practice to what we call precision casting, it is necessary to hold the dimensions much more accurately, much more precisely than in the jewelry field. In a precision casting for industry, dimensions are all-important; whereas in jewelry it is only appearance that is important, and whether the piece of jewelry is slightly larger or slightly smaller is of small import.

453

By Mr. Groner:

Q. Now, Mr. Tour, are you familiar with the patent in suit? A. I am.

Mr. Groner: I may note parenthetically that the patent in suit appears in the volume Defendants' Exhibit B as page 502a, if it please your Honor.

The Court: I have it here in a memorandum which accompanied the plaintiff's brief.

454 *Defendants' Witness, Sam Tour, Direct*

Q. Ignoring the limitations of the claims of the patent in suit, will you state to what it refers and its general purpose? A. The first sentence of the patent states:

"The principal object of this invention is to facilitate the casting of small metal articles, particularly articles of intricate detail such as jewelry * * *."

And the last paragraph before the claims states:

"It will be understood that this process is particularly applicable to the casting of precious metal, but it will also
455 be understood that various other metals may be handled in the same way and particularly, base metals of tin and similar alloys."

Q. Is the process disclosed in the patent applicable to the casting of other articles than jewelry? A. Yes, sir, it is.

Q. Now, will you describe briefly the system disclosed in the patent in suit, and in referring to "system" there, I do not mean to go into particular means at any one of the steps, but just the broad basic statement of the steps and their sequence? A. The system of the patent is to start with a model; build a mold around that model; then after removing the model, make wax castings in that
456 mold as replicas of the model; invest these wax castings with a refractory investment material; melt out the wax; introduce molten metal into the cavity to produce a casting, and then break out the mold to recover the casting.

Q. Now, you are familiar, Mr. Tour, with the Kraiqud patent? A. Yes, sir.

Mr. Groner: May we simply to avoid possible inadvertence later, offer Defendants' Exhibit B for identification.

The Court: All right. B for identification is received in evidence.

(Defendants' Exhibit B for identification received in evidence.)

Q. Is there any difference in the system employed by the Kralund patent and the system which you have just outlined as disclosed in the patent in suit? A. With the exception of the making of an original model which Kralund does not mention, there is no difference in the system between Kralund and the patent in suit.

Q. And you mean by that that Kralund follows the same sequence of steps as does the patent in suit, is that right? A. That is right, the same steps in the same sequence. 458

Q. Now with relation to Kralund's omission of any mention of building up the primary mold around an original model, what is the effect of that omission? A. It has little effect. The practice in the die casting art and in the foundry art in general through the years has been to build the patterns or molds from blueprints or from models, according to what was available. It is no particular point to make a model if a metal mold is to be machined from it, and only when the metal mold is to be cast around the model is there need of a model. But if the cavity in question can be machined, or must be machined, there is no need of a model.

Q. However, as I understand you, both methods are entirely conventional, is that correct? A. That is true. 459

Q. Now, except for the strength of metal used in the die casting die or mold, referred to by Kralund, and the multipart metal molds which have been referred to here, is there any essential difference between Kralund's die or mold and the ordinary multipart metal mold? A. There is no difference.

Q. Are there any steps in which there is any difference in means between Kralund and the patent in suit? A. Kralund refers to the use of pressure for making the wax or fusable metal replica without specific mention of centrifugal casting.

Q. Does he refer to pressure die casting? A. He refers to pressure die casting.

Q. Are they alternative means, pressure die casting on the one hand and centrifugal on the other, of performing the same operation? A. They are.

Q. And is that historically true? A. That is true.

Q. And was that true as of the time of Kralund which issued in September, 1917? A. It was true at that time.

Q. Have you had any practical experience, Mr. Tour, in the practice of the process of the Kralund patent? A. I have.

461 Q. Will you outline the nature of your experience? A. I worked with Mr. Kralund at Doehler's Die Casting Company to whom the patent is assigned, and in experimental work there with Mr. Kralund I did some of the work in connection with this particular method.

Q. Now, you refer to experimental work with Mr. Kralund. Did the work you did with him go beyond the experimental, or would you explain what you mean there? A. Well, his work had to do with production in the plant. I as metallurgist was not a production worker, so naturally what I did in that type of work was experimental upon my part, because I was not a production employee in any casting department, whereas Mr. Kralund was plant superin-
462 tendent at the time.

Q. Was the Kralund method a practical and operative method? A. Quite.

Q. Now Mr. Tour, the Kralund patent states on page 414: "My invention relates to a method or art of making commercial castings and more particularly to such a method which is especially adapted for the production of castings of large bulk requiring no machining after completion to bring them to size or give the desired finish thereto." Does this mean that the method is limited to castings of large bulk? A. It does not. The method is applicable to castings of small, intermediate, as well as large size. Is there any statement in the Kralund patent bearing on that?

Mr. D. Cooper: Why don't you call his attention to what you have in mind to save time?

Mr. Groner: I call attention, particularly, Mr. Cooper, to the statement beginning at the bottom of page 414a, line 104. It says:

"By reason of the character of the material which may be used in making the patterns above referred to, there are substantially no limitations upon the size of the castings which may be made."

Q. Now, is that a practical fact, Mr. Tour? A. That is true.

464

Q. Has the process to your knowledge been applied to the casting of small articles? A. It has been applied very extensively during this war to the casting of millions of small articles.

Q. And have you had to do with that casting operation? A. I have.

Q. Did you hear yesterday Mr. Debler testify to his knowledge of commercial casting? A. Yes, sir.

Q. Did he testify to the method disclosed in the Kralund patent? A. He described the Kralund method precisely.

Q. Is there any basic difference between the "commercial castings" referred to by the Kralund patent and other types of castings? That is, is Kralund limited to what is called "commercial castings"? A. In no way limited.

465

Q. Are the castings made according to the Kralund method accurate? A. They are. They are what we call now precision castings.

Q. And how is their accuracy as compared with the necessary accuracy of jewelry castings? A. They are more accurate, and necessarily more accurate than jewelry castings on the whole.

Q. Do such commercial castings have undercuts and projections or depressions in the article to be cast? A. A very large percentage of them do.

Q. Is there any limitation upon the intricacy of castings

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made by the Kralund process?, A. There is no such limitation.

Q. Now, Mr. Tour, I assume you are familiar with the Austenal prior use testimony? A. Yes, sir.

Q. Will you consider step by step the process employed by Austenal in comparison with the process described in the patent in suit.

Mr. D. Cooper: Isn't that an incompetent question, because there is some dispute in this Austenal proof.

467 The Court: Beg pardon?

Mr. D. Cooper: I say there is some dispute about the Austenal proofs, and some uncertainty about the Austenal proof, and this witness, of course, can't possibly resolve that uncertain indefiniteness.

The Court: No, he cannot. The objection is well taken. If he has personal knowledge of the Austenal process he can tell us what it is, but not if he got it from reading the testimony in this case.

Mr. Groner: Certainly. That is entirely true, your Honor, and the question was asked on the assumption that he was only comparing the steps as disclosed by the testimony with the steps as dis-
468 closed by the patent in suit. There is no controversy, there is no attack in this record upon the sequence of steps and upon the appliances or means used. That testimony stands absolutely, not only unimpeached but unquestioned.

Mr. D. Cooper: Well I beg to differ with you on that, and it seems to me we are just getting into one of these cases where in respect to this Austenal process, which the judge in New Jersey said was uncertain, and trying to make certain out of what is uncertain by the testimony of this witness.

Mr. Groner: Well, naturally if your Honor is of the opinion that the Austenal testimony is not suf-

ficient, though I say there is no controversy as to the method which all of the Austenal witnesses describe, then your Honor will disregard what has been said, but there must be some method of bringing to your Honor's attention the comparison or contrast between the Austenal method and the method of the patent in suit, and if the proof is not sustained then the comparison falls, but the comparison it seems to me, must be made in order that the two things relate themselves.

Mr. D. Cooper: I think the comparison is properly made in a brief, and not by an expert witness. 470

The Court: Well, that is precisely the question I wanted to ask: are there conditions there of equivalence, or other matters which would require an expert translation?

Mr. Groner: That is exactly what I was coming to, your Honor.

The Court: Then I will hear it.

Mr. Groner: Now may we have the original question, please?

(Question read.)

Q. Go ahead, Mr. Tour. A. First, the purpose of the Austenal method is described as a procedure in which to 471
make a rubber mold in which to produce wax patterns, from which to produce a Steele backing, which is a metal casting in this case. Then the first step is the taking of a model which is the original Steele backing, and which step is precisely the same as the original model in the Jungersen patent.

The next step is to make a rubber mold around that model, vulcanizing the rubber in place, and then removing the model, which is precisely the same step as in the Jungersen patent.

The next step then is to produce a wax pattern in this rubber mold, introducing the wax as necessary to fill the

cavity in the mold, and in that case finding it necessary to squirt the wax in with an eyedropper, as they found the wax did not flow in by simple gravity satisfactorily enough to fill up the little ridge at the bottom of the mold, and so they squirted it in to get it down in there.

The next step—

Q. And how does that compare with the corresponding step of the patent in suit, Mr. Tour? A. That is the application of sufficient pressure on the wax to cause it to fill the molds in the same fashion as Jungersen refers to centrifugal casting, for the purpose of applying sufficient
473 pressure to fill the mold.

The next step then is to invest this wax pattern in a suitable investment. In the case of the Austenal method they, of course, attach the wax pattern to another wax form, so that the final casting would be an assemblage of this small wax pattern, hand-fashioned or other fashioned wax.

Q. You mean the latter being the denture? A. That is true. That compares to the practice of the Jungersen method of taking individual a number of individual waxes and assembling them on sprues into one flask, and thereby casting a number of castings all attached together.

Q. Is it fair to say that in either case— A. Which they
474 intended to later cut apart, whereas in the denture they do not intend to take it apart.

Q. Either is simply a matter of manufacturing convenience? A. That is true. Then after the investment in both the Austenal process and the patent in suit the wax is eliminated by melting and heating, and then finally the casting is made by introducing the molten metal into the cavity, using sufficient pressure to fill the cavity whether it is centrifugal or otherwise.

Q. The patent in suit suggested centrifugal. What form of casting the molten metal did Austenal employ; do you know, Mr. Tour? A. He used both the centrifugal method and the pressure method, both of those methods having been common in the general art for many many years.

Q. Now following your comparison of these methods, it was only at the step of introducing the wax to the mold, a rubber mold in both cases, that there was any difference of any nature. You have testified that Austenal used an eyedropper, a squirt, and that the patent in suit used the centrifugal machine? A. That is right.

Q. Is there any difference in the effect of these two means? A. There is none. They are both means of applying sufficient pressure to fill a mold.

Q. And were they interchangeably used at the time of the Austenal operation? That is in 1932-33? 476

The Court: Was the centrifugal machine a commonly known device? Is that what you mean?

Mr. Groner: Exactly.

The Court: As used in this case.

The Witness: The centrifugal machine is common, and ordinarily in the dental industry, it has been used extensively since early 1900.

Q. And the eyedropper, was it also known as a means to apply force to molten material? A. That was old in the art.

Q. Now how about the degree of accuracy required in the making of the Steele backings as compared with that necessary to make a piece of jewelry? A. The degree of accuracy required in the Steele backings is quite high. That is, the part between the porcelain facing and the backing must be very close, so that the amount of cement required will not be excessive and will not flow. The normal tolerance is of the order of 1/1000 of an inch, whereas nothing in the nature of 1/1000th of an inch is of any worry to a jeweler. 477

Q. Is the Austenal method applicable to other things than the casting of Steele's backings or dental articles? A. Yes, it is applicable to any type of casting desired, and the end use is immaterial.

Q. You are familiar, Mr. Tour, with the Hazeltine patent, the Spencer patent and the "La Gravure" publication. A. I am.

Q. Is there any difference between the systems as employed by those two patents and the one publication and that of the patent in suit? A. No, sir. Fundamentally they all follow the same system.

Q. I will ask Mr. Tour if he will state the system as disclosed in those two patents and in the publication. A. The procedure in general in the three methods described is exactly the same as Jungersen with the exception that in none
479 of the three cases do they refer to the use of pressure in making the wax.

In the case of both Hazeltine and La Gravure pressure is used for making the final casting.

The Spencer uses a rubber mold which is backed up with a plaster of paris cast reinforcing.

The Hazeltine uses a rubber mold which is held in shape by being immersed in water, and also for the purpose of cooling.

La Gravure is a mold made up out of an elastic type of material. A gelatin mold instead of rubber.

The steps in the procedure all the way through are iden-
480 tical with the same sequence of a model, making a mold around the model, making the wax, investing the wax, melting out the wax and making a cast.

Q. Now, you are familiar with the method of Cellini, I assume, Mr. Tour? A. Yes.

Q. And does it follow the same broad procedure? A. That is true, the same broad procedure with the exception that his mold in which he makes the wax or prepares his wax for melting out is in effect a multipart mold made of plaster of paris.

Q. What was the nature of the work achieved by Cellini in the practice of that method, Mr. Tour? A. It was recognized as the highest art in statuary and jewelry casting.

The Court: I will take judicial notice of some of those masterpieces.

Q. Did the works done by Cellini include some delicate and undercut parts? A. Yes, they did.

Q. Was there anything in the method of Cellini, or of Spencer, or of "La Gravure," or of Hazeltine, limiting the application of the method to large castings? A. None at all in the method either as described or even stated.

Q. Now, you referred to the several different types of mold; the rubber mold of Hazeltine and Spencer, the gelatin mold of "La Gravure" and the multipart ceramic mold of Cellini. You have also referred to the mold or die of Kralund. Will you explain whether or not molds of these various types are and have been generally and interchangeably used in the casting art? A. They have been used generally and still are used generally and interchangeably in the casting art. Wherever a specific thing or method seems most applicable that is the one that is used.

Q. And for how long has that been true? A. Presumably ever since the days of Cellini for his method and so on for the other methods; certainly as long as I have been acquainted with the casting art, which is some 27 years.

Q. Now, you have referred to the particular advantage of one over the other in particular circumstances. Could you broadly indicate something of the choice that the artisan in the casting field makes and the reason for his choice? A. Well, I might cite an example of the numerous parts we made during this World War in precision casting where the precision necessary was so great that the yielding of a rubber mold—

Q. You mean the distortion by yielding, Mr. Tour? A. That is right.

In introducing the wax or in permitting it to get the wax out was too much to allow for accuracy, and it was necessary to use carefully machined metal molds in order to maintain the high accuracy.

484 *Defendants' Witness, Sam Tour, Direct*

Also, in order to fill out some of the detail it was necessary to use rather high pressures in making the waxes, and so much more rigid molds were necessary and wax injection molding machines are now available, and they claim they use pressures up as high as 40,000 pounds per square inch which require very strong steel dies to hold.

Q. If you are making something in which the tolerances are greater, I assume you can use the less accurate molds? A. That is true.

The Court: So that the rubber mold is low in the range
485 of precision?

The Witness: That is right. Yes, sir.

Q. Are you familiar with the file history of the patent in suit, which is Defendants' Exhibit C? A. I am.

Mr. Groner: May it please your Honor, I warn in advance we are not now coming to a file history limitation. There has been some talk by my brothers as to certain of the art on which the defendants here rely having been disposed of in the Patent Office, and I simply propose to raise enough of the question to show that in that ex parte proceeding the Patent Office was led to believe certain things which ac-
486 tually I believe are not the fact.

Mr. D. Cooper: Of course, the rule here is that the tentative debates between the applicant and the Patent Office are not admissible.

The Court: What is not admissible?

Mr. D. Cooper: The tentative debates between the Examiner and applicant are not admissible and do not result in any estoppel.

Mr. Groner: I am not using it as an estoppel.

The Court: I do not know just what counsel proposes to develop, but I am willing to take a chance, and if he is off on a route which leads nowhere I wish you would rise and object.

Mr. Groner: On page 42 of the file history which is a part of the remarks made by the applicant in his statement entered April 1, 1936 and aimed at avoiding the Spencer patent to which reference has here been made, it is said:

"Spencer's resilient mold made of strips of rubber would bulge under the stress set up by centrifugal force."

And the next to the last paragraph on that same page:

"It is really an absurdity to even imagine anyone whirling Spencer's rubber-strip mold in a centrifugal machine in order to make a casting whether of wax or metal." 488

By Mr. Groner:

Q. Now, from your acquaintance with that patent, is it a fact that you could not whirl a Spencer mold in a centrifugal machine? A. It is not a fact. The Spencer mold is backed up with plaster of paris castings to hold it in shape and the entire assembly could be whirled very readily in a centrifugal machine.

Q. Is the plaster backing disclosed in the Spencer patent comparable to the plates which Mr. Shaw described yesterday and which Mr. Jungersen used in making his demonstration? A. Quite comparable. 489

Q. Now, from page 48 of the file history there is a statement: "Applicant's"—that is Jungersen's—"Applicant's solid rubber mold cannot bulge under the stresses imposed by the process."

Is that the fact? A. That is not true.

Q. And what is necessary in order to avoid that? A. The fact is that the rubber mold must be backed up and

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held together so that it won't come apart and bulge; and even then there will be the limited degree of bulging that you get with the pressure for the degree to which the rubber has been vulcanized The softer the rubber the more it will bulge for the given centrifugal pressure, and the harder the rubber the less it will bulge.

Q. Is there any suggestion in the patent in suit as to the necessity for using these metal backing plates on the rubber mold? A. There is no mention of that.

Q. Is there any reference in the patent in suit to the size or thickness of the mold there disclosed? A. There is no
491 specific reference, simply a statement that sufficient rubber is placed in to cover the model and the illustration happens to show one-half of the mold thicker than the other half, but there is no explanation as to why.

Q. Is there any limitation on the thickness of the mold of the Spencer patent? A. No, sir. There is the caution in the Spencer patent that the mold should be thinner at the places where the undercuts are serious so that it will flex more readily and be able to be pulled from the undercuts more readily. A similar thing is accomplished in the Jungerson mold that was demonstrated here by the cut through the body of the mold so it would flex readily to
492 come out of an undercut.

Q. I think you testified both with respect to Hazeltine and Spencer that there is no limitation on the size of the rubber mold which might be employed? A. That is true.

Q. Or as to the type of work which might be reproduced in such a rubber mold; is that correct? A. That is correct.

Q. What is the effect, Mr. Tour, of centrifugally casting the wax as disclosed in the patent in suit? A. The effect is the application of a small amount of pressure.

Q. And what is the effect of casting the metal as also disclosed in the patent in suit?

The Court: In a centrifugal machine?

Mr. Groner: In a centrifugal machine, yes, sir.

A. That is again the application of pressure.

Q. What is the difference in the function of the machine in the two cases? A. There is no difference. The machine functions exactly the same.

Q. And I think it was testified yesterday that centrifugal force had been used long prior to the patent in suit. Did you hear such testimony? A. Yes, sir.

Q. Does that accord with your knowledge on the subject? A. Yes, sir. 494

Q. Are you familiar with the McManus patent? A. Yes, sir.

Q. Would you briefly describe the subject-matter?

Mr. Groner: Incidentally, that patent issued May 29, 1923, on an application filed in 1919.

A. This patent has to do with a centrifugal casting machine in which is incorporated electrical heating devices for heating the metal and also for melting out wax from a mold.

Q. Does it suggest uses to which the machine might be adapted? A. It refers in column 1, the beginning line 23, to "With slight modifications in the structure of the apparatus it may be equally as well applied to the casting of 495 jewelry, such as gold rings, small trinkets, and so forth."

Q. Now you are familiar with the book, "Die Casting Practice by Stern"? A. Yes, sir.

Q. Does it refer to the centrifugal casting of molten material? A. It does.

Q. And does it bring together various types of molds which might be used and various types of casting which might be used? A. It does.

Q. Could you just briefly refer to some of the molds and some of the applied pressure means suggested in that book? A. On page 4 is a summary which referring to

molds states they may be classified as follows: One, single purpose molds; and, two, multiple purpose molds. And the multiple purpose molds are subdivided into two groups, non-metallic molds and metallic molds. Then the non-metallic molds are subdivided into three: One, stereotyped molds—that is, referring to the metal of which the mold is made; two, wooden molds; and, three, rubber molds.

Q. Now, how about the types of casting summarized in that 1930 book, Mr. Tour? A. Then it carries on with a listing of five types of casting: No. 1 being slush casting; No. 2 being pressure casting; No. 3 being centrifugal casting; No. 4 being permanent mold casting; No. 5 being die casting. And following this brief summary it goes into many pages of detailed description of each of the modifications.

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Q. Have you also an article by a Mr. Mortimer appearing on the same general subject-matter?

Mr. D. Cooper: Have you shown it to us at any time?

Mr. Groner: Yes, sir, in October of last year. It is in the transcript in the other case, though, and it is simply relied on as showing the general state of the art in 1926. It is not in any sense anticipatory.

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A. This is a paper by Mr. George Mortimer on the subject of die casting of aluminum alloys, and a review of current methods, which was presented to the Institute of Metals in England and published in the Journal of the Institute of Metals, Volume 35.

The Court: What year?

The Witness: Presented in 1926. It describes—it reviews the methods of casting and with reference to page 375 of the journal lists five methods of casting; slush casting, gravity casting, centrifugal casting, cothias casting and pressure casting, and then it describes each of those five in some detail.

Q. Does it make any statement with relation to centrifugal casting, Mr. Tour? I believe also on page 377. A. On page 377 it states in connection with the difficulty in filling a mold by gravity: 499

"It was natural, therefore, that engineers should early turn their attention to some form of artificial pressure whereby the mold could be filled by force and soundness and clean definition seemingly assured. The simplest form of artificial pressure is that of centrifugal force."

Mr. Groner: That is all. 500

Cross Examination by Mr. D. Cooper:

Q. Mr. Tour, did you testify at length in the New Jersey suit? That is the one brought by Ostby and Barton Company v. Mr. Jungersen? A. Yes, sir.

Q. And you testified there to the same effect as you testified to here? A. Yes, sir.

By the Court:

Q. You have described the art as being quite familiar with the various alternative means of casting an article of intricate design, have you not? A. Yes, sir. 501

Q. Now, there has been testimony here that for many years prior to Jungersen the jewelry art or the jewelry trade used the cuttlebone and the sand casting method and occasionally the steel die or metal die stamping method? A. Yes.

Q. And that it had not used, or that it had not extensively used, whichever you prefer, this method of using centrifugally created molds in either the rubber or metal form? A. Yes.

Q. Now, have you in your study and knowledge of the casting art generally been able to arrive at a reason why for these many years the jewelry trade did not turn to this

allegedly well known method of getting greater precision and greater definition in its wares and merchandise? A. I think I can discuss this subject—first of all, your Honor, I am afraid that I will have to sort of disagree with the impression that the bulk of jewelry was made by the cuttlefish or sand casting process. The bulk of rings and so forth were actually made by the stamping process through the years.

Q. Using a punching machine of some kind? A. Yes, drop hammers.

503 The cuttlefish and sand casting processes were used for special features of jewelry made to customers' order and for very special or limited or exclusive designs.

There was through the years quite a bit of plaster mold casting used for special design jewelry which was not the lost wax process, but still the precision process in plaster with the assembling by soldering or welding means, and the cost of a stamping plant in the way of equipment is considerable, so that it was the large stamping houses that did the bulk of business, and with the quantities done it was rather cheap to produce rings by the stamping process.

504 The centrifugal or lost wax process makes possible the manufacture of a few rings, or a hundred rings, more economically than the stamping processes. However, if the ring can be made by the stamping process and there are a thousand or more rings to make, it is now even cheaper to do it by the stamping process, and so the bulk of rings that can be made by the stamping process are so made.

The trend in jewelry is like the trend in styles. During the past ten years parts of that type of jewelry which is rather difficult to make by stamping is much more easily made by casting, whereas the type of jewelry prior to that, the last ten years, was more of the flat design, which the stamping houses could do quite readily.

Q. Well, was it because they did not know how to do the other? In other words, was the process the product of the dictate of fashion, or the fashion the dictate of the limitations of practice? A. I think primarily it was the limitation of practice in that they knew how to produce by, for example, the cuttlefish process a little more handwork than necessary, but still no quantities were produced that way, because most of the designs were more readily produced by stamping means and cheaper. Yet the designs became pushed in advertising and through the jewelry stores into the complicated types of designs and of the designs quite popular now, and the casting method came along with it and now is quite popular. There is no assurance that styles won't change back again.

There has always been some objection upon the part of the final jeweler who sets stones and has to resize cast rings, and that objection still has to be overcome in many places. It is unfortunate, but many cast rings have slight hard spots in them from included particles of investment from included dross and the engraver's tool when it strikes that hard article is deflected, and the hand engraver much prefers to work the wrought material than the cast material, and there are many jewelry shops now where the men are really artisans in hand engraving and they much prefer to start out with something not in the way of one of these castings.

Q. You did not suppose it possible—I am guessing now—that intricate jewelry was a luxury and therefore the cost of production was not a factor taken seriously into consideration for a long time, and that only as popular jewelry became an article of extensive commerce did the question of cost production enter into it? Did that play any part? A. I think that has played a decided part, your Honor.

Mr. Groner: May I ask, bearing on the same subject—

508 A. (Continuing) You now have quite a bit of costume—

Q. Costume jewelry? A. What we call costume jewelry, being cast by this process, which is getting into what we now class as cheap jewelry.

By Mr. Groner:

Q. Mr. Tour, you have been called on a number of occasions by jewelry concerns for consultation work, have you not? A. Yes, sir.

Q. Have you ever known of any jewelry concern to
509 have regularly on its pay roll an engineer? A. Not in my definition of engineers. Some have what they call engineers, but they are not what in the professional engineering sense you would call technical engineers.

Mr. Groner: That is all, your Honor.

By Mr. D. Cooper:

Q. How long have you been called on in a consulting capacity for the jewelry art? A. Since about 1930, about 16 years.

Q. It was earlier than that, wasn't it? A. It may have been 1929, something like that, approximately along there. It was after I left the Doehler Casting Company.

510 Q. Let me ask you this question: When was the cuttlefish process to your knowledge first used in the jewelry trade? A. As far as I know, it has been used for generations.

Q. Well, I say, when to your knowledge was it first used in the jewelry trade? To your knowledge. A. Well, I think I read about it back in the early twenties. You mean when did I actually see it in use?

Q. Well, your answer is sufficient for my present purposes, but I will ask the same question as to sand casting. When was that first used in jewelry manufacturing, so far as you know?

The Court: You mean as far as he knows from his reading or observation?

Mr. D. Cooper: Well, I will ask him for his observation now.

A: By actual observation, some time around 1930. From reading, for centuries.

Q. And those two processes, sand casting and cuttlefish manufacture, were the only ones used for reproduction aside from the dies, weren't they, by jewelers? A. No, sir, the plaster casting process was used, casting in plaster of Paris. 512

Q. For making intricate designs? A. Yes, sir.

Q. And that has gone out completely, according to the present testimony, has it not? A. Gone out?

Q. Yes. A. No, sir. That is still practiced.

Q. Where? Just mention one that you know about. A. There is a firm in Providence that I visited in the late thirties who were doing quite a bit of that.

Q. That is the only one you know about? A. And there is a firm in New York City at the present time doing it.

Q. What is the name of the New York concern, and what is the name of the Providence concern? A. I don't recall now the name of the Providence concern, and I am sorry I am not at liberty to state the name of the firm here for whom I am consultant, and they consider their method of producing this novelty jewelry as something they do not care to have anybody know how they are doing it. 513

Q. So that those two uses, one just now in New York and one in Providence in 1939, are the only ones you personally know about? A. That I have had personal experience with in their plants, yes, sir.

Mr. D. Cooper: That is all.

514 *Plaintiff's Witness, Joseph Robinson, Direct*

The Court: All right.

Mr. Groner: I should like to introduce as Defendants' Exhibit O a stipulation entered into by the parties in Jungersen v. Jenkins in the District Court for the District of Maryland.

(Marked Defendants' Exhibit O.)

Mr. Groner: Defendants rest, your Honor.

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515 JOSEPH ROBINSON, called as a witness on behalf of plaintiff in rebuttal, being first duly sworn, testified as follows:

Direct Examination by Mr. D. Cooper:

Q. You are an engineer, Mr. Robinson? A. Yes, I am a development engineer, president of Joseph Robinson, Inc., which is a development company.

Q. And you live in New York City? A. Yes, sir.

Q. And how long have you been employed in or about New York City in generally the capacity you have stated? A. Well, I own this company and it has been in existence about 20 years.

516 Q. Have you had to with casting? A. Yes. My engineering training began with the blacksmith shop, up through the foundry, machine shop, drafting board, into development and research work.

Q. Have you had to do with the United States Government in relation to precision casting? A. Yes, sir. I was head engineer of Industrial Processes and Products of the Office of Production Research and Development, which is a part of the War Production Board, and while there I had charge of precision casting.

Q. Are you familiar with the Jungersen process for making jewelry? A. Yes, sir. I was a member of the Advisory Committee on Precision Casting of the National

Research Council, and in that capacity as well as in my capacity with the War Production Board I had occasion to investigate the Jungersen process.

Q. Now, I call your attention to a patent to one Kralund, No. 1,238,789. You are familiar with that patent? A. Yes, sir. When you asked me last night to come down I made some notes on that patent, of which I have a copy here.

Q. All right. Now, I want to call your attention to the statement in that patent that "in the practice of my method or art I make a sectional mold or die," and so forth. If you make a mold or die in the process of 518 manufacturing jewelry, what do you do with it? A. Beg pardon?

Q. If you make a mold or a die in the process of manufacturing jewelry, what do you do with the die? A. The die, you use it for stamping generally.

Q. And there would be no occasion for reproducing from that for use in jewelry manufacture? A. You mean using the steel die for reproduction of wax patterns?

Q. Yes. A. I should say no, there would be no need of that at all. If you have the die you might as well use it for stamping purposes.

Q. It does not cost anything of account to stamp out 519 any gold from a steel die, I suppose? A. Not if you have the die.

Q. You say you studied this Kralund patent? A. Yes, I read through it.

Q. Will you state what your understanding of it is so far as it relates to the Jungersen patent that is here in issue? A. Do you wish me to express my opinion as to the relationship between the Kralund and the Jungersen process?

Q. Yes. A. I don't see any.

The Court: You see no relationship between the two?

The Witness: No, your Honor. The Kralund

patent in my judgment begins as a die casting patent and ends as a die casting patent. It does not teach anything else. Its object was to escape the heat deteriorating effect of large pieces upon his die, upon these expensive steel machine-cut dies by using the primary die, that is, his expensive die, for the production of a wax pattern which he would then invest by typical investment technique and make a casting in the ceramic mold thus produced, and in that way he would avoid the heat deteriorating effect of the large pieces on his expensive metal die.
521 As I read Kralund, he teaches nothing else. That was his sole purpose, his sole aim. I think he states that there.

Mr. D. Cooper: That is all.

Cross Examination by Mr. Groner:

Q. Mr. Robinson, you referred to the die method in the Kralund patent and said if one had such a die they would stamp rather than use a casting operation; is that correct? A. Well, my statement was intended to be that if you have a steel die for your purpose there is no need to use that die for making a wax pattern.

522 Q. Now, with relation to the Kralund patent, when Kralund used the word "die," wasn't he speaking of a mold, simply a multi-part metal mold? A. As I understand Kralund he is referring to Fig. 1, which shows the conventional die caster's die, and he uses that die for the purpose of making a wax pattern of the part he wishes to cast. Then he invests that—

By the Court:

Q. He does not use it to stamp out the wax? A. No.

Q. He just uses the form of the die to constitute the cavity into which to shape his wax, isn't that true? A. That is true, your Honor, but if a jeweler has a steel die of the piece he wishes to make—

Q. Then he would stamp? A. Yes. There is no reason for him to use that die for the purpose of making a wax casting.

Q. But that is not what Kralund says? A. Kralund starts out with a die-casting die which is of that type and in which metal is injected under pressure, hot metal, and finding it deteriorating under the heat of large pieces, he uses—

Q. So he uses his die to shape a wax model of that which the die would form if it were used as a stamping device? A. A wax casting pattern which he in turn invests and which becomes a substitute for his die casting. 524

Q. So the die really becomes the female of a model? A. Yes, it becomes in the wax casting sense the basic mold, the primary mold.

The Court: That is right.

By Mr. Groner:

Q. Mr. Robinson, he speaks of it actually as a die or mold, does he not? A. Yes, he refers to it as mold or die.

Q. And he uses it as a mold, does he not? A. As a primary mold, yes.

Q. And the cavity into which he injects wax under pressure; that is correct, isn't it? A. He injects it under pressure? I think he fills it with wax. I don't find it in his patent anywhere, and I am not trying to forget. 525

Q. Well, I commend you to page 2, which is page 415 of the book your Honor has, to lines 18 to 23, and ask you to read those, if you please, out loud. A. "The invention consists in the method or art of making commercial castings consisting in forming a pattern by forcing molten material having a low fusing point into a metal mold or die"—

Q. Now, that is enough of that. Doesn't the expression "forcing molten material" indicate the application of pressure to you? A. Yes, I would think so.

526 *Plaintiff's Witness, Joseph Robinson, Cross*

Q. I also call your attention to lines 58 in the same column of the same page. A. Do you wish me to read it?

Q. I do, sir. A. (Reading) "This die is adapted for use in an ordinary pressure die-casting apparatus, by means of which the cavity formed by the portions *a-b* of the mold sections *a-b* is filled with a low fusing material such as wax, or a metal alloy having a low fusing point"—

Q. That is enough of that. Now, will you go to the second column, line 72. A. Do you wish me to read it?

527 Q. If you please, sir. A. (Reading) "The die *a-b* is provided with the usual vents and the contact of the molten wax or other material forced into the mold or die under pressure"—

Q. And so forth. That is enough as far as I am concerned. Now, is there any question in your mind about the fact that Kralund does force wax or other low fusing material into a cavity which he calls a mold or die, and that he does it under pressure? A. That is clear. I was called on short notice down here.

Q. Now, isn't it also the fact that when the application of pressure is desired in order to force any molten material into a cavity or mold or die, that you may use either die pressure casting apparatus or centrifugal means or
528 any number of other means to do it? A. I would certainly not use it as a die-casting apparatus. The pressure is too high.

Q. I see. So if you moderate the pressure of the die casting it will be all right, is that correct? A. It might be. The pressure in a rubber mold, for instance, would be very low, and whether you can bring your die casting pressure down that low would be another question.

Q. So all you would have to do would be to moderate the pressure? A. Assuming that you could.

Q. As any engineer could do? A. I myself know of no die pressure casting machine in which you can bring the

pressure down to the low point required or advisable for the intricate and small pieces of casting jewelry.

Q. Mr. Robinson, isn't it possible that if you needed only a small amount of pressure, to achieve that small amount of pressure either through a conventional or an adapted die pressure machine?" A. Mr. Groner, the spirit of your examination is realized by this witness. A lot of things are possible. We stumble around daily over important inventions and discoveries. I think this is an example of it. What is possible to do with a machine, a die pressure casting machine, and what is feasible are two different things. 530

Q. Would not any engineer know if casting a relatively small article that he would need relatively low pressure? A. But your question began by asking if we could put wax into a mold by a die casting pressure machine and I said no, I do not think you can.

Q. You think Kralund does not work? A. I do not think Kralund puts his wax in with a die pressure casting machine.

Q. What do you think he does? A. He pours the wax in.

Q. Despite the thrice reiterated statement that he uses pressure? A. He says it can be done. My understanding 531
of Kralund is large castings—I might state if you are making casting of the size indicated in the Kralund patent, you might in that case be able to force your wax in, because of the body and substantial resistance capacity of the massive size of the wax pattern. But when you get down to small intricate parts, that is another thing, and I assume that is this case here.

Q. If you could not moderate the amount of pressure, which incidentally is not stated by Kralund, if you could not moderate the pressure of a die casting apparatus, wouldn't it be simple enough to get other means which would moderate the pressure to give you the amount

532 *Plaintiff's Witness, Joseph Robinson, Cross*

you needed for whatever size casting you needed? A. Mr. Groner, many things are possible. I do not like to answer questions of that kind. We might be able to get heavier-than-air ships to hover over the sea—

Q. Have you ever seen castings done according to the Kralund method? A. You mean die casting?

Q. As defined in the Kralund patent. A. You mean a substitute, the way he gets his substitute die?

Q. Have you ever seen casting as described in the Kralund patent by which a wax model is made in a mold by injection with a die-casting machine and then invested and
533 then burned out and then cast? A. I have never seen a die pressure casting machine used to inject wax into a die or any other form of receptacle.

Q. Is there any basic difference between a pressure die casting apparatus and any of the other injection means common to the art? A. I think there is definitely.

Q. In the effect? A. Yes, I think there is a distinct difference between the die pressure casting machine effect and your so-called syringe, eye dropper, or centrifugal force.

Q. Why? A. Well, I think in the first place, as I told you, the die pressure casting machine in my opinion, which
534 is based upon considerable experience, your Honor, is adapted for large pieces where substantial power is required to apply the metal, and the machine and the dies are built to stand it. The centrifugal force machine, the application of power there to the part being cast depends upon the size of the part being cast. You can use a machine, for instance, a centrifugal machine, put a pound of metal in it and you will get a force on that metal in the degree of its weight and mass, and if it is a small piece it is automatically proportioned to that, and, of course, that is not true in die casting at all. Now, your eye dropper, if you will allow me to be humorous

about it, it seems to me it would be a rather humorous way to try to make a wax pattern in a mold.

Q. Are you aware of the fact that they have been done, Mr. Robinson? A. Mr. Groner, I have been engaged in development and research for 35 years. I have been aware of a lot of things that have been attempted and occasionally done; but as a feasible, practical, commercial proposition I do not know of any such thing to exist, and I have been practically all over this country in the precision casting plants, using the Jungersen, the Austenal, and other processes. As I told you I was on that committee for the duration of the war, practically, and also I went to Germany as a classmate, so to speak, of Dr. Tour on this specific assignment. He went over on metallurgy and I went over on precision casting to investigate the technique in Germany for the Joint Chief of Staff.

The Court: It is conceded by both sides that the intervenors used the methods which you have claimed to be the prior art, namely, cuttlefish, sand casting and stamping prior to January 1, 1934, and that some time after 1934 it was that they first began using the process which you now claim is the Jungersen process.

SAM TOUR, recalled by the defendants in surrebuttal, having been previously duly sworn, testified as follows:

Direct Examination by Mr. Groner:

Q. Mr. Tour, you have testified before today here? A. Yes, sir.

Q. You testified, I believe, that you were familiar with pressure die casting. A. Yes, sir. I was with Doehler Die Casting Company for eight years and then consultant since for a number of die casting companies.

538 Q. Is it possible to regulate the pressure in a pressure die casting apparatus? A. Yes, sir; it is.

Q. And how low is it possible to regulate that pressure? A. We have gone down to approximately 3 pounds per square inch.

Q. Is that a pressure comparable with that used under ordinary circumstances in the casting of wax patterns? A. That is a rather common pressure used in the so-called air machine for wax injection in the precision casting field.

Q. Then you mean it is a comparable pressure? A.
539 Yes, sir.

Q. And is it possible to reduce the pressure sufficiently to make wax patterns of small and intricate objects in a pressure die casting apparatus? A. Yes, sir; it is.

Q. Could you name some examples of such small articles which have been so made in that machine, or the patterns of which have been so made? A. The pressure die casting machine, the entire pressure die casting industry was originally built around the making of small castings. One of the shining examples of small castings made by pressure die casting methods is the zipper, not only the slider but the scoops are die cast on the tape,
540 as examples of small die castings. During the war many small die castings were made for instrument parts. It is the practice now to make a number of jewelry parts, the so-called costume jewelry is being die cast in pressure die casting machines out of zinc alloys.

Q. Now, Mr. Tour, I refer you to the Králund patent, page 415a, the second column, in the paragraph commencing at line 111. Will you read that? A. (Reading): "When the plaster mold has been thus made, metal having the desired properties for a finished casting is poured or otherwise introduced into this plastic material, as by means of a pressure die casting apparatus in which metal is cast under very low pressures, the ordinary die casting

method of die pressure being impracticable with a mold as fragile as the one above referred to."

Q. Now is that, and was that at the time of the Kralund patent a practical means of achieving a casting? A. Yes, sir; it was. We used pressures at that time all the way down to three pounds per square inch.

Q. So you could in reality adjust your pressure to the necessities of your particular casting operation; is that a fact? A. That is right. Pressures are always adjusted to the particular job.

Q. And is that not true with substantially all casting operations, Mr. Tour? A. That is true in all casting operations, substantially. 542

Cross Examination by Mr. D. Cooper:

Q. I call your attention to the fact that Kralund says in his patent, at the foot of column 1 of the first page: "When I refer to small castings I refer to those castings the weight of which is from 2 to 3 pounds, or less." That is what he was dealing with, isn't it? A. He was, I believe, referring to the type of castings that were then regularly made as die castings, direct in metal, as being castings of 2 to 3 pounds. It was not until somewhat after the time of this patent that die casting machines were developed to make the larger castings. The marvel of the '30's was a die casting machine large enough to cast a radiator grille of an automobile. Prior to that the die casting art was limited to small castings. 543

Q. Well, what he means by small castings are castings of 2 or 3 pounds, and doesn't he speak of the weight of 2 to 3 pounds? That is the point of my question and I would like to have you answer it directly. A. I thought I did. He means a small casting is a casting that weighs less than 2 or 3 pounds.

544 *Defendants' Witness, Sam Tour, Cross*

Q. No. He says, "When I refer to small castings I refer to those castings the weight of which is from 2 to 3 pounds, or less." A. Or less. In other words, I interpret that to mean up to 2 to 3 pounds.

The Court: Not in excess of that?

The Witness: Yes, sir; that is right.

Q. And you find nothing else about the size of castings in that patent? A. Oh, he then says, beginning at the bottom of the next column, that by his method then he is not limited to this weight. "By reason of the character of the material which may be used in making the patterns above referred to, there are substantially no limitations upon the size of castings which may be made."

545

Q. Well, that you think refers to increasing the size, don't you? A. That is right.

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Plaintiff's Exhibit 1.

Jungersen Patent No. 2,118,468.

(See opposite pages.)

552

EXHIBIT
U. S. Dist. Court
S. D. of N. Y.
NOV 25 1946

Patented May 24, 1938

2,118,468

UNITED STATES PATENT OFFICE.

2,118,468

METHOD OF CASTING ARTICLES OF INTRICATE DESIGN AND A PRODUCT THEREOF

Thoger G. Jungersen, Mimico, Ontario, Canada

Application September 28, 1934, Serial No. 745,893

6 Claims. (Cl. 22—190)

The principal object of this invention is to facilitate the casting of small metal articles, particularly articles of intricate detail such as jewelry which frequently are designed with hollows, undercut portions and perforations, so that they will have a smooth clean surface faithful in detail to the original and free from imperfections or holes, and to enable such result being accomplished with the minimum of expense.

A further object of the invention is to enable the formation of intricate castings which will so closely resemble the original and finished product that the slow and tedious work of patterning and detail cutting required in connection with present casting methods is eliminated.

The principal features of the invention are hereinafter defined step by step in reference to the accompanying drawing, in which Figure 1 is a sectional view of a flexible mould which is built in separable sections around a model of the article to be reproduced.

Figure 2 is a sectional view showing the fusible model of the article to be produced invested in the mould in which the article is to be cast.

Figure 3 is a diagrammatic sectional elevational view illustrating the manner of centrifugal casting of the fusible model and of the metal.

In carrying this invention into effect the designer of a piece of jewelry or any small article to be cast produces a model of the article in wood, metal or other suitable material, and this may have undercut surfaces, hollows or perforations of any desirable kind. This model is placed upon a base and a flexible mould-forming material such as rubber, is built up around the model, the top surface being arranged to form a parting line along suitable lines of the model.

This bottom section 1 of the mould is formed with a plurality of dowel or socket holes 2 arranged over the surface thereof closely around the model 3. When the lower mould section is completed the top section 4 is built thereover to encircle the remaining portion of the model and to form projecting teeth 5 to extend into the guide holes in the lower section 1.

A suitable gate or pouring recess is formed in the meeting faces of the half sections of the mould.

The mould thus constructed is preferably made of rubber and when the rubber material completely surrounds the model it is suitably vulcanized and caused to flow intimately about the detail structure of the model and thus assumes a permanent shape having a cavity the exact shape and detail of the model embedded therein.

This mould is then separated and the model is removed and the half sections of the mould are brought together again and placed in a suitable form of centrifugal casting machine 7.

A suitable quantity of a very low temperature fusing material which may be wax or a metallic alloy such as Wood's metal is poured into the gate and the mould is rotated rapidly in the centrifugal casting machine. The wax or metal is thus forced into the mould and by the centrifugal action displaces the air within the mould, the molten material congealing first against the exposed surfaces of the cavity formed in the mould and any air which may be trapped in a recess of the mould will be crowded back into the fluid body under the pressure applied thereto and the fluid material will advance into the recess as it crowds the air therefrom and will progressively congeal against the wall of the recess until the extreme limit is reached so that the finest of cavities will be completely filled.

It is essential that the air be expelled from the mould progressively as the molten material flows in so that all interstices whether undercut or otherwise, are completely filled.

When this step in the method has been completed the mould is removed from the centrifugal machine and the flexible sections are separated.

The flexible rubber material from which the mould is made permits the moulded wax to be withdrawn without injury to undercut surfaces or delicate parts.

The pattern thus produced is then invested in a material which will form a suitable mould for the metal which it is ultimately desired to form to that shape. The wax may be dipped in a solution of plaster of Paris or of silica, and it may then have an investment material such as plaster of Paris poured therearound, or it may be invested directly in a more or less fluid mass.

This investing material may be dried out in any suitable manner, but is preferably dried in a furnace, but in any event the mould created by the flowing material is subjected to sufficient heat to melt the wax or other material of which the temporary pattern is made and all traces of this wax are completely removed from the mould.

The mould is then placed in the centrifugal casting machine and the molten metal from which the casting is to be made is poured into this mould and is projected under applied force into the fine recesses preferably by the centrifugal action. Finally, the mould is separated from the casting.

The final result is that an article is cast which

is the exact replica of the original model. It will be readily understood that once the original flexible mould is made any desirable number of the patterns of fusible material may be produced to be invested in metal-receiving material to form moulds and any desirable number of metal casting moulds may thus be produced from the same model. All will be equally accurate and as the final mould is a complete investment of the wax or other fusible pattern, there will be a minimum of irregularities to be removed.

The ultimate result is that metal castings of rings, brooches and many pieces of jewelry which are frequently very fine and intricate may be produced at the very minimum of cost. For example, with known processes of casting rings, it may take an expert jewelry worker several hours to finish a ring to a certain standard after casting, while with the present process, only fifteen to thirty minutes may be required to finish a ring to the same standard. These figures are for ordinary rings, such as "Exhibit A" on file herein. With finer work in platinum, from twelve to fifteen dollars' worth of labor may be expended in making a ring by hand by known methods, while as little as ten minutes would cover the time of casting the same ring by the present process, and the time necessary for finishing it might cost as little as one dollar, or about one-twelfth of the cost of finishing the ring by known methods. The process of the present invention will produce rings on a quantity basis without the necessity of making dies,—a huge saving in itself, since a good set of dies costs from $100 to perhaps $1000. As compared with this excessive investment which the use of dies requires, the present process makes rings and other articles of jewelry at a total cost of from $2 to $3.50 for the first mould. Thus a manufacturer employing this process may effect large savings in capital investment in dies and in precious metals (since a large number of rings etc., must be made at the same time from a die in order to justify the expense of a die, while only a few rings need be made from a mould made in accordance with this invention to pay for the cost of the mould several times over). Hence it is clear that the process of the present invention may effect savings up to 90% in the cost of production, especially if the production is for orders of less than 1000.

It will be understood that this process is particularly applicable to the casting of precious metals, but it will also be understood that various other metals may be handled in the same way and particularly, base metals of tin and similar alloys.

What I claim as my invention is:—

1. A method of casting articles of jewelry of intricate design consisting in first producing a model of the article to be cast, then forming about said model a primary mould of a plastic material which will retain a lasting shape through subsequent treatment, then removing the model from the primary mould, then by centrifugal action forcing into the primary mould molten wax or other material of a low fusing point that will not injure the primary mould to form a pattern, and employing the patterns so made for the manufacture of casting moulds.

2. A method of casting articles of jewelry of intricate design consisting in, first making a model of the article desired to be cast, then forming a primary mould in separable sections thereabout of plastic material capable of assuming intimate contact with the intricate designs of the model and adapted to retain the assumed shape, then removing the model, then by centrifugal force projecting into the mould cavity and completely filling same a molten material of a low fusing point which will not injure the mould, then removing the fusible pattern so cast, then investing said pattern in a refractory material which will assume all the contours of its intricate design to form a secondary mould, then heat treating said investment removing the low fusing pattern therefrom, then by centrifugal force projecting molten metal into the heat treated mould, and finally removing said mould from the cast article.

3. A method of casting articles of jewelry as claimed in claim 1 in which the plastic material of which the primary mould is formed is treated to retain its assumed shape and after such treatment remains flexible and is flexed in the act of removing the model to withdraw the mould material from the intricacies of the model.

4. A method of casting articles of jewelry as claimed in claim 2 in which the pattern formed by projecting the pattern material into the primary mould under applied force and thereby provided with a surface free from imperfections is invested with a fluid coating of a finely ground refractory material, said refractory material being built up to a thickness sufficient to withstand the stresses to be applied by forcing molten metal thereinto to form the article to be produced.

5. A method of casting an article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions, comprising first producing a model of the article to be cast, then forming about said model a primary mould, then removing the model from the primary mould, then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould molten wax or other material of low fusing point that will not injure the primary mould to form a pattern, and employing the patterns so made for the manufacture of a casting mould.

6. An article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions made by a process comprising first producing a model of the article to be cast, then forming about said model a primary mould, then removing the model from the primary mould, then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould, molten wax or other material of low fusing point that will not injure the primary mould to form a pattern, and employing the pattern so made for the manufacture of a casting mould.

THOGER G. JUNGERSEN.

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May 24, 1938. T. G. JUNGERSEN 2,118,468

METHOD OF CASTING ARTICLES OF INTRICATE DESIGN AND A PRODUCT THEREOF

Filed Sept. 28, 1934

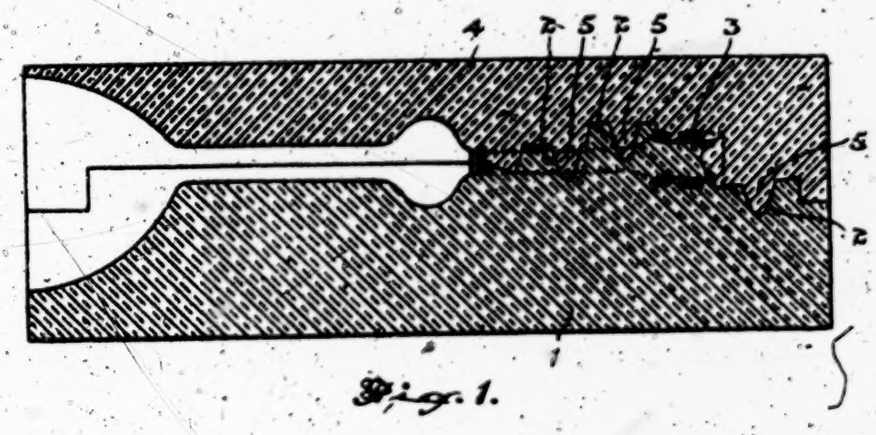

Fig. 1.

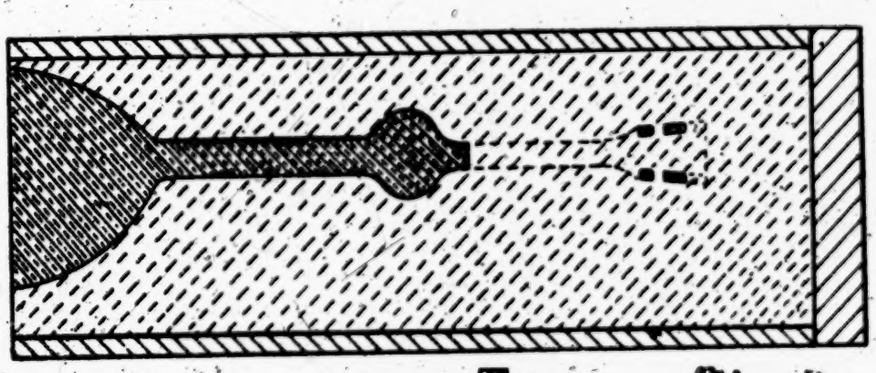

Fig. 2.

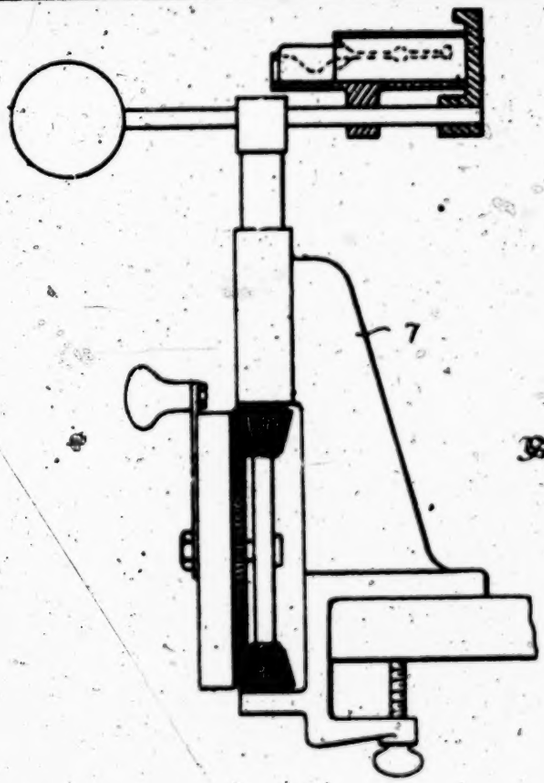

Fig. 3.

Inventor.
Theger G Jungersen
by A. J. Eckman
atty

562 **Plaintiff's Exhibit 2.**

(Filed Feb. 26, 1944.)

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

THOGER GRONBERG JUNGERSEN, Plaintiff, vs. ROBERT BADEN, ROSE BADEN, ALBERT FOSS and GLADYS FOSS, co-partners doing business under the name of Baden & Foss, Defendants.	Civil Action No. 24-221.

563

Defendants' Objections and Answers to Plaintiff's Interrogatories.

Defendants object to each and all of plaintiff's interrogatories as premature, being a discovery sought prior to joinder of issue, and further object upon the grounds stated under specific interrogatories which, for convenience, 564 are here repeated, as follows:

1. Have the defendants made or caused to be made a wax or other destructible pattern of a piece of jewelry or a part thereof?

A. Yes.

2. Have the defendants made or caused to be made a mold or molds for the production of a destructible pattern of a piece of jewelry or a part thereof?

A. Yes.

3. If the answer to interrogatory 2 is in the affirmative, did the defendants use or cause to be used a model to make the mold or molds?

A. Yes.

Plaintiff's Exhibit 2

565

4. If the answer to interrogatory 2 is in the affirmative, state what material was used for making the pattern-making mold or molds, for example, was it rubber, gelatine, metal, wood, or some other material?

A. Pattern making molds made by defendants and their predecessor have been of various materials, including aluminum, monel metal, and rubber.

5. Have the defendants used or caused to be used a mold or molds for the manufacture of a wax or other destructible pattern of a piece of jewelry or a part thereof?

566

A. Yes.

6. If the answer to interrogatory 5 is in the affirmative, state the nature of the material of the mold or molds used.

Answered under 4 above. Objected to as repetitious.

7. If the defendants made or caused to be made a wax or other destructible pattern by introducing molten wax or other destructible material into a mold, then the defendants are requested to state how the molten wax or other destructible material was introduced into the mold, such as, for example, by a syringe, eye-dropper, air pressure, vacuum, mechanical force, centrifugal force, or any other kind of force.

567

A. Defendants and their predecessor have introduced melted wax into a mold by various means including a hand syringe, an eye-dropper, and mechanical or centrifugal force.

8. Did the defendants employ or caused to be employed a wax pattern made in a mold for the manufacture of a precious metal casting mold by investing the pattern in any investment material?

A. Yes.

9. Did the defendants make or cause to be made an article of jewelry by first making a primary mold about

568 *Plaintiff's Exhibit 2*

a model, making a pattern of wax or other destructible material in said primary mold by an applied force, investing said pattern with a refractory material, then melting out or otherwise disposing of the pattern, leaving a cavity and casting the article of jewelry or parts thereof into such cavity?

A. Yes.

10. If the answer to interrogatory 9 is in the affirmative, state how the wax or other destructible material was introduced into the primary mold in order to make the wax
569 pattern, such as, for example, by a syringe, eye-dropper, air pressure, vacuum, mechanical force, centrifugal force, or any other kind of force?

Answered under 7. Objected to as repetitious.

11. If the answer to interrogatory 9 is in the affirmative, did the defendants sell or cause to be sold any articles of jewelry or parts thereof made in accordance with the answer to interrogatory 9?

A. Yes.

12. If the answer to interrogatory 11 is in the affirmative, state to whom such articles of jewelry or parts thereof were sold.

570 A. Such articles were sold to the jewelry trade generally. If the interrogatory be construed as calling for a more detailed answer, it is objected to as irrelevant and burdensome.

13. If the answers to interrogatories 1, 2, 5, 7, 8 and 9 are in the affirmative, what article of jewelry was involved, for example, was it a lady's ring or a man's ring, or a part thereof, a brooch or a part thereof, etc.?

A. Complete rings were involved, both for ladies and for gentlemen.

14. If the answer to interrogatory 5 is in the affirmative, give the dates of the first and last uses of the

molds and the dates of the first and last sales of any piece of jewelry made by the use of such mold. 571

Objected to as irrelevant and burdensome. The affirmative answer to 5, upon which the above is conditioned, is by that interrogatory limited to the period beginning May 24, 1938, and ending February 14, 1944, thus adequately defining the period inquired about.

15. State to whom the jewelry referred to in the answer to interrogatory 14 was sold or for whom it was made and describe the article such as, for example, was it a ring or a brooch, or a part of either, and so forth? 572

Objected to for the same reasons as stated under 14, upon which the above depends, and for the further reason that it is adequately answered under 12 and 13 and is therefore repetitious and multifarious.

16. If the answer to interrogatory 9 is in the affirmative, state when the defendants first and last used or caused to be used the steps described in interrogatory 9 in producing an article of jewelry or any part thereof.

Objected to as irrelevant and burdensome. The affirmative answer to 5, upon which the above is conditioned is by that interrogatory limited to the period beginning May 24, 1938 and ending February 14, 1944, thus adequately defining the period inquired about. 573

17. If the answer to interrogatories 2, 5, 7 and/or 9 are in the affirmative, where did defendants obtain the knowledge of the processes involved and give the name and address of informant.

No answer is required, since "All interrogatories hereinbelow refer to the time between the date of issuance of the patent in suit and the date of the filing of the suit" (Plaintiff's interrogatories, page 1, para. 1), and defendants had knowledge of "the processes involved" in interrogatories 2, 5, 7 and/or 9, long prior to that period. This is objected to as irrelevant and immaterial and so speculative,

574 *Plaintiff's Exhibit 2*

vague and obviously captious as to be improper. Defendants did not learn any casting process from plaintiff, however.

18. If the answers to interrogatories 2, 5 and 7 are in the affirmative, give the dates when the defendants first and last used or caused to be used the steps described in said interrogatories.

Objected to as irrelevant and burdensome. The affirmative answers to 2, 5 and 7, upon which the above is conditioned, are by those interrogatories limited to the period
575 beginning May 24, 1938 and ending February 14, 1944, thus adequately defining the period inquired about.

19. If the defendants were taught the process or processes referred to in interrogatory 17, what equipment was used by the teacher, such as, for example, a model, a mold, casting section or base, a core, plaster of Paris or other blocking out material, wax, syringe or eye-dropper or other liquid or molten wax forcing equipment, sprue holder, investment material, cylinder investment material holder, centrifugal casting machine or other molten metal casting equipment?

No answer is required for the reasons stated under 17,
576 upon which the above depends. It is objected to as irrelevant and immaterial to any possible issue herein.

20. If the answers to interrogatories 2, 5, 7 and/or 9 are in the affirmative, give the names and complete addresses of every person now or in the past employed by the defendants, who has in the past or who now does perform any or all of the steps described in any of said interrogatories in the production of jewelry or other articles in accordance with such steps, and describe the steps that each of such persons performed.

21. If the defendants sold jewelry produced by any or all of the steps described in interrogatories 2, 5, 7 and/or 9, give the names and complete addresses of each person

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who has been in the past and now is employed by the defendants in making such sales or otherwise involved in the distribution of such articles.

22. Give the names and addresses of all persons, firms or corporations to whom the sales referred to in interrogatory 21 were made and who are now engaged in the distribution of such articles.

Objected to as unduly burdensome and clearly irrelevant. It can serve no useful purpose to answer under oath by giving defendants' and their predecessors' manufacturing payroll records for the past six years, and it 578
is obviously impossible for defendants, or anyone else, to "describe the steps that each of such persons performed" during that period, as required by 20. Defendants have employed as many as fifty persons at a time in their plant and as few as twenty persons or less during the period. These interrogatories also are obviously captious and designed solely to annoy and harass defendants. Interrogatory 21 likewise seeks defendants' sales pay roll records for the same period and 22 seeks defendants' full sales records, including various shipping memoranda, statements, etc., for the past six years.

Objection to each of these interrogatories is further made upon the ground that it is at this stage premature, 579
before plaintiff has established any act of alleged infringement by defendants which would entitle plaintiff to the accounting prayed for and to which alone the answer called for by each relates.

/s/ JOHN VAUGHAN GRONER
/s/ JOHN B. CUNINGHAM
Attorneys for Defendants.

February 23, 1944.

580 **Defendants' Exhibit O.**

IN THE

UNITED STATES DISTRICT COURT,

FOR THE DISTRICT OF MARYLAND.

THOGER GRONBERG JUNGERSEN, Plaintiff, vs. HOWARD O. JENKINS, individually, and trading as JENKINS JEWELRY MANUFACTURING COMPANY, and J. JENKINS SONS CO., Inc., a body corporate, Defendants.	Civil Action No. 216 Infringement of U. S. Patent No. 2,118,468.

581

Stipulation

TO THE HONORABLE JUDGES OF THE DISTRICT COURT OF THE UNITED STATES IN AND FOR THE DISTRICT OF MARYLAND:

In lieu of Answer to Plaintiff's Complaint, Answer to Plaintiff's Interrogatories under Rule 33 addressed to Defendants, and in lieu of Discovery in accordance with
582 Plaintiff's motion Under Rule 34, the Defendants' acts set forth below being referred to the time between the issuance of the patent in suit and the date of the filing of the suit, the following is stipulated:

1. Defendants admit the identity of Jungersen as alleged, the identity of the Defendants as alleged, the jurisdiction of the Court, and that Jungersen is the owner of patent No. 2,118,468 which patent is duly issued to the inventor Jungersen.

2. The Defendants, in their reproduction process, made metal molds from models to be duplicated.

Defendants' Exhibit O

3. The defendants made wax patterns in said metal molds by forcing molten wax into the said molds with a syringe such as an ear syringe. 583

4. The Defendants made secondary molds from said wax patterns by investing said patterns in an investment material.

5. The Defendants cast metal into said secondary molds in the making of the finished article.

6. The Defendants made castings of intricate external configuration such as jewelry including rings in accordance with the above process. 584

7. The Defendants sold castings of intricate external configuration such as jewelry including rings in accordance with the above process.

8. The Defendants admit that the process described and claimed in Jungersen patent No. 2,118,468 reads on the above process carried out by the Defendants.

9. The Defendants admit that the articles claimed in the Jungersen patent No. 2,118,468 reads on articles sold by the Defendants.

10. The Defendants admit carrying out the process generally taught by the patent. 585

11. The Defendants admit that they have sold articles of jewelry corresponding to the articles in accordance with the Jungersen invention as set forth in United States patent No. 2,118,468.

12. The Defendants admit the widespread commercial success of the Jungersen process as taught in patent No. 2,118,468 as evidenced by the many licenses granted under the said patent for a valuable consideration and as evidenced by the attached affidavits which indicate the importance of the process in the respective businesses of

586 *Defendants' Exhibit O*

the affiants; the licenses and affidavits are to be considered as if they were all originals and properly executed; the papers mentioned in this paragraph are attached and marked "Exhibit A—Papers Mentioned in Paragraph 12 of the Stipulation"; the said papers are listed as follows:

Affidavits

George Shaw
Herbert L. Nussbaum
Morris Kaplan
587 Harold Victor Tyler (original copy of Exhibit in later mentioned English case)
Herbert Nussbaum
Benjamin Dubin
Benjamin Dubin
George Shaw

License Agreements

Thoger G. Jungersen and Messrs. F. & F. Felger, Inc.
Goldsmith Bros. Smelting & Refining Company Limited and The Levy Bros. Company Limited
588 Goldsmith Bros. Smelting & Refining Company Limited and Robert Amell & Co.
Thoger G. Jungersen and England, Klein & Levy, Inc.
Thoger G. Jungersen by Sigmund Cohn, his agent, and The Eisenstadt Manufacturing Company.
Thoger G. Jungersen and Messrs. Oscar Heyman & Brothers, Inc.
Thoger G. Jungersen and Ida Jewelry Company, Inc.
Thoger G. Jungersen by Sigmund Cohn, his agent, and Morris Kaplan & Sons

Defendants' Exhibit O

Thoger G. Jungersen and Messrs. Katz & Ogush, Inc.
Thoger G. Jungersen by Sigmund Cohn, his agent, and Louis Koppel.
Thoger G. Jungersen and Larter & Sons.
Thoger G. Jungersen and B. Leader & Sons
Thoger G. Jungersen and Harry Lieberman, D.B.A. Associated Jewelers
Thoger G. Jungersen and Mel Harris Company and Davidson & Licht Jewelry Co., Associated.
Thoger G. Jungersen and I. Margolin.
Thoger G. Jungersen and J. Milbening, Inc.
Thoger G. Jungersen and Nathan & Berg.
Thoger G. Jungersen and Shiman Bros. & Co. Inc.
Thoger G. Jungersen and Messrs. Silberman, Kohn & Wallenstein, Inc.
Thoger G. Jungersen and L. G. Silvermaster.
Thoger G. Jungersen and Traub Manufacturing Company
Thoger G. Jungersen and Krementz & Company.
Thoger G. Jungersen and United Manufacturing Jewelers Inc.
Thoger G. Jungersen and Untermeyer Robbins & Co. Inc.
Thoger G. Jungersen and J. R. Wood & Sons, Inc.
Thoger G. Jungersen and Charles C. Weston

13. The Defendants admit that the photographs, castings, wax patterns, and syringe marked "Exhibit B" which are attached relate to the apparatus and articles of the above mentioned process and are typical of the teachings and the process described in Jungersen patent No. 2,118,468.

14. It is stipulated by the parties to the above controversy that copies of patents, papers from patent records, licenses and affidavits are to be considered as if

592 *Defendants' Exhibit O*

they were certified or as if they were originals and properly executed in this controversy.

15. The Defendants admit that the British patent No. 449,062 corresponds to Jungersen's United States patent No. 2,118,468; that the Royal Court of Justice in England and in that division of the Royal Court of Justice known as the Patent Appeal Tribunal, held that the said British patent should be sealed in favor of Mr. Jungersen despite the opposition brought by the opposer set forth below, the said Appeal Tribunal being the highest Court of Ap-
593 peal having jurisdiction over such patent controversies; a copy of the decision in that case is attached, which copy is admitted to be a true copy; a copy of the Jungersen United States patent No. 2,118,468 has been marked "Exhibit C"; a copy of the corresponding British patent No. 449,062 has been marked "Exhibit D"; a copy of the decision of the English Court has been marked "Exhibit E"; the opposer in the English case to the Jungersen invention was the well known Johnson, Matthey & Company, Limited, of England, the largest metallurgical institution of its kind in the world as evidenced by the report from the Department of Commerce which is also attached hereto and marked "Exhibit F."

594 16. The Defendants admit that the following countries have recognized the Jungersen invention corresponding to that taught in United States patent No. 2,118,468 by granting the following:

Belgium Patent No. 427,554
French Patent No. 837,094
Italian Patent No. 362,421
South African Patent No. 1040/38
German Patent No. 656,016
Canadian Patent No. 360,805/36

copies of these patents are attached and marked "Exhibit G."

Defendants' Exhibit O

17. The Defendants and their attorneys have considered in their interpretation of the above, the prior art made of record in the Jungersen file wrapper and additional prior art not found in the Jungersen file wrapper but ascertained after a thorough extended investigation including the Cuttlefish Process; the said prior art is attached and marked "Exhibit H"; a certified copy of the said Jungersen file wrapper being attached and marked "Exhibit I."

18. In view of the above stipulated items, Plaintiff and Defendants agree that the remaining issue to be decided is the validity of the Jungersen patent which is contested by the Defendants, infringement having been admitted.

19. Plaintiff and Defendants agree that the remaining issue, as set forth in Item No. 18, should be decided upon at an oral hearing before the Court and that briefs may be submitted in view of the facts stipulated to aid in determining the remaining issue which briefs may be filed within seven days after the filing of this stipulation.

IRVIN SIEGAEL
902 Hearst Tower Building
Baltimore, Maryland
Attorney for Plaintiff.

A. YATES DOWELL
1158 Minsey Building
Washington, D. C.
Counsel for Plaintiff.

SAMUELS & CLARK
THOMAS W. Y. CLARK
SAMUELS & CLARK
712 Keyser Building
Baltimore, Maryland
Attorney for Defendants.

Counsel for Defendants.

598 **Stipulation *re* Contents of Record of Appeal.**

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

The above-named plaintiff having filed a notice of appeal to the Circuit Court of Appeals for the Second Circuit from the Final Judgment entered in this action, it is hereby

599 STIPULATED AND AGREED by and between counsel for said plaintiff and defendants that the following shall constitute the record on appeal:

1. Statement
2. Complaint
3. Answer and counterclaim
4. Reply
5. Order granting motion to intervene
6. Intervenors' answer and counterclaim
7. Stipulation of January 2, 1947

600

8. Reply to counterclaim of intervenors
9. Opinion
10. Letter of February 12, 1947, to Judge Rifkind from Fish, Richardson & Neave
11. Letter of February 14, 1947, to Fish, Richardson & Neave from Judge Rifkind
12. Findings of fact and conclusions of law
13. Final judgment
14. Notice of appeal by plaintiff

Stipulation re Contents of Record of Appeal 601

15. Transcript of testimony

16. Exhibits

Plaintiff's

1—Patent in suit No. 2,118,468

2—Answer to plaintiff's interrogatories

3—Rubber mold (Physical)

4—Sectioned investment ring (Physical)

5—Cuttlefish mold (Physical) 602

6—Box of rings (Physical)

7—Box of waxes (Physical)

8—Opinion of Judge Luxmoore (printed in Defendants' Exhibit B, pp. 508a-513a)

9—Group of rings (Physical)

Defendants'

B—Pp. 385a-498a, inclusive, of Volume II of printed record on appeal in case of Ostby & Barton Company v. Jungersen, Appeal Nos. 9222 and 9223 in the United States Circuit Court of Appeals for the Third Circuit. 603

C—File wrapper of patent in suit No. 2,118,468

D—Pp. 297a-342a, inclusive, of Volume I of printed record on appeal in case set forth with respect to Exhibit B.

E—Flask (Physical)

F—Flask (Physical)

G—Denture (Physical)

H—Wax tooth patterns (Physical)

I—Four rings (Physical)

604 *Stipulation re Contents of Record of Appeal*

J—Rubber mold (Physical)

K—Metal mold (Physical)

L—Syringe (Physical)

M—Flask of rings (Physical)

N—Flask of rings (Physical)

O—Stipulation entered into in the case of Jungersen v. Jenkins in the United States District Court, District of Maryland

605 18. This stipulation.

19. Any stipulation or order, or both, extending time to docket record on appeal

20. A stipulation or order, or both, relating to treating Defendants' Exhibits B, C and D as physical exhibits

IT IS HEREBY FURTHER STIPULATED:

That all of the foregoing (except all the physical exhibits and Defendants' Exhibit B [in which is printed Plaintiff's Exhibit 8] and Defendants' Exhibits C and D) shall be printed with an appropriate index and shall constitute the record on appeal.

606

DRURY W. COOPER,
Counsel for Plaintiff.
JOHN VAUGHAN GRONER,
Attorney for Defendants
and Intervenors.

Dated: September 24, 1947.

Stipulation. 607

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

WHEREAS the plaintiff in the above-entitled action filed a Notice of Appeal on July 17, 1947, from a final judgment rendered against him on April 23, 1947, it is hereby

STIPULATED between counsel for the above-named parties that the time for docketing and filing plaintiff's record 608 on appeal in this case be extended to and including October 15, 1947, which is not more than ninety days from the time of filing said notice of appeal.

DRURY W. COOPER,
Counsel for Plaintiff.
JOHN VAUGHAN GRONER,
Attorney for Defendants
and Intervenors.

Dated: July 29, 1947.

So Ordered:

609

WILLIAM V. CONNELL,
Clerk of the U. S. District Court,
Southern District of New York.

Dated: August 19, 1947.

610 **Stipulation.**

UNITED STATES CIRCUIT COURT OF APPEALS,

FOR THE SECOND CIRCUIT.

[SAME TITLE.]

The above-named plaintiff, having heretofore filed notice of appeal to the Circuit Court of Appeals for the Second Circuit from the Final Judgment in this action, and the parties having stipulated the contents of record on appeal and that the same shall be printed in its entirety except as contained in this stipulation, it is hereby

611 STIPULATED between counsel for the parties, subject to the approval and order of this Court, as follows:

1. That Defendants' Exhibit B, which comprises pages 383a-498a, inclusive, of Volume II of the printed record on appeal in the case of Ostby and Barton Company vs. Jungersen in the United States Circuit Court of Appeals for the Third Circuit, and Defendants' Exhibit D, which comprises pages 297a-344a, inclusive, of Volume I of the same printed record on appeal, need not be printed as a part of the record on appeal in this case to this Court and may be treated as a physical exhibit with four (4) copies of each of said Volumes II and I to be handed
612 up at the time of the argument of the appeal in this case.

2. That Defendants' Exhibit C, which is the file wrapper and contents thereof of the Jungersen patent in suit No. 2,118,468, need not be printed as a part of the record on appeal in this case and may be treated as a physical exhibit, and said file wrapper and contents may be handed up at the time of the argument of this case.

DRURY W. COOPER,
Counsel for Plaintiff.
JOHN VAUGHAN GRONER,
Attorney for Defendants
and Intervenors.

Dated: September 24th, 1947.

So ordered this day of September, 1947.

Stipulation.

613

(Filed Oct. 9, 1947)

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE SECOND CIRCUIT.

[SAME TITLE.]

WHEREAS the above-named plaintiff-appellant filed a notice of appeal on July 17, 1947, from a final judgment entered and filed on April 23, 1947, in the office of the Clerk of the United States District Court for the Southern District of New York, and

614

WHEREAS, an order pursuant to stipulation of counsel for the above-named parties was entered and filed on August 19, 1947, extending the time for docketing and filing the record on appeal to and including October 15, 1947, it is hereby

STIPULATED between counsel for the above-named parties, subject to the approval of this Court, that the time for docketing and filing the record on appeal in this case be further extended to October 31, 1947.

615

Dated: October 8, 1947.

DRURY W. COOPER,
Counsel for Plaintiff-Appellant.
JOHN VAUGHN GRONER,
Attorney for Defendants-Appellees and Intervenors-Appellees.

So ordered this 9 day of October, 1947.

ALEXANDER M. BELL,
Clerk, United States Circuit Court of Appeals, for the Second Circuit.

616 **Stipulation.**

(Filed Oct. 30, 1947)

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE SECOND CIRCUIT.

[SAME TITLE.]

WHEREAS an order of this Court, pursuant to stipulation of counsel, having previously extended the time for docketing and filing the record on appeal in the above-
617 identified case to and including October 31, 1947, it is hereby

STIPULATED between counsel for the above-named parties, subject to the approval of this Court, that the time for docketing and filing the record on appeal in this case be further extended to November 29, 1947.

Dated: October 30, 1947.

(Sgd.) DRURY W. COOPER,
Counsel for Plaintiff-Appellant.
JOHN VAUGHN GRONER,
Attorney for Defendants-Appellees
618 and Intervenors-Appellees.

So ordered this 30th day of October, 1947.

ALEXANDER M. BELL,
Clerk, United States Circuit Court
of Appeals, for the Second Circuit.

Stipulation. 619

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

It is hereby stipulated and agreed, that the foregoing is a true transcript of the record of the said District Court in the above-entitled matter as agreed on by the parties.

Dated, November , 1947. 620

DRURY W. COOPER,
Counsel for Plaintiff-Appellant.
JOHN VAUGHAN GRONER,
Attorney for Defendants-Appellees and Intervenors-Appellees.

621

622 **Clerk's Certificate.**

UNITED STATES DISTRICT COURT,

SOUTHERN DISTRICT OF NEW YORK.

[SAME TITLE.]

I, WILLIAM V. CONNELL, Clerk of the District Court of the United States of America for the Southern District of New York, do hereby certify that the foregoing is a true transcript of the record of the said District Court in the above-entitled matter as agreed on by the parties.

623

IN TESTIMONY WHEREOF, I have caused the seal of the said Court to be hereunto affixed, at the City of New York, in the Southern District of New York, this day of November, in the year of our Lord one thousand nine hundred and forty-seven, and of the independence of the said United States the one hundred and seventy-second.

WILLIAM V. CONNELL,
Clerk.

624

UNITED STATES CIRCUIT COURT OF APPEALS 625

FOR THE SECOND CIRCUIT

No. 180—October Term, 1947.

(Argued February 9, 1948 Decided March 10, 1948.)

Docket No. 20897

THOGER GRONBERG JUNGERSEN,

Plaintiff-Appellant, 626

—v.—

ROBERT BADEN, *et al.,*

Defendants-Appellees.

Before:

L. HAND, AUGUSTUS N. HAND and CLARK,

Circuit Judges.

627

Appeal from the District Court of the United States for the Southern District of New York.

Action by Thoger Jungersen against Robert Baden and others, doing business under the name of Baden & Foss, wherein Axel Bros., Inc., and others intervened, for patent infringement. From a final judgment dismissing the action, 69 F. Supp. 922, the plaintiff appeals. Affirmed.

628 DRURY W. COOPER, of New York City (John N. Cooper, of New York City, and Karl W. Flocks, of Washington, D. C., on the brief), *for plaintiff-appellant.*

JOHN VAUGHAN GRONER, of New York City (Robert B. Whittredge and Fish, Richardson & Neave, all of New York City, on the brief), *for defendants-appellees.*

CLARK, *Circuit Judge*:

629 This appeal involves the validity of Patent No. 2,118,468 for a "Method of Casting Articles of Intricate Design and A Product Thereof," issued to the plaintiff on May 24, 1938. Though the answers of both the original and the intervening defendants to the plaintiff's claim of infringement denied infringement as well as the validity of the patent, the district court found infringement by all the defendants as to at least some of their operations; and that is conceded on this appeal. The court, however, held all the claims of the patent invalid for want of invention and because anticipated, and ordered the action dismissed with prejudice. Judge Rifkind wrote a carefully considered 630 opinion in which he described in detail the state of the prior art and discussed the contentions of the parties. D. C. S. D. N. Y., 69 F. Supp. 922. We agree with the views he expressed, and in our discussion shall assume the reader's familiarity with the extensive statement he has made.

The patent in suit consists of five claims for the method of casting he sets forth and a sixth claim for a product or article produced by this method. The process described is, with certain modifications, similar to the ancient "cire perdue" or the "lost wax" process. In brief, Jungersen's method is as follows: First a model of the article to be

reproduced is made and a flexible mould-forming material such as rubber is built around it. The model is then removed from this mould, and wax or other material of a low fusing point is centrifugally cast into the mould. Next the wax pattern so obtained is removed and invested in plaster of Paris or other suitable material in order to form a secondary mould in which the metal may be cast. The wax is then melted out and all traces of it are removed from the mould. And finally, molten metal is centrifugally cast into this secondary mould. The resulting article is an exact replica of the original model. By using centrifugal casting, the wax and the metal are forced into the finest recesses of the moulds so as to assure accuracy of reproduction, no matter how intricate the design. Of the claims the first four are based directly on the process described, referring to the forcing "by centrifugal action" of both the molten wax into the primary mould and the molten metal into the secondary mould. See the second claim quoted at page 922 of 69 F. Supp. The fifth claim requires only the introducing of the material "into the mould by force sufficient to deposit" it in the depressions of the mould. And the sixth or product claim is similarly general. 631 632

Admittedly much of this is in the prior art. Indeed, plaintiff in effect so acknowledges. Thus he states his British Patent No. 449,062, for "Improvements in Method and Means of Casting Metals", June 19, 1936, covering this same process: "In the casting of metal it is not broadly new to make an elastic mould from an original sample or model, to produce a wax or fusible pattern with the aid of the elastic mould and to remove the pattern from the latter and invest it in a final mould from which the wax or fusible pattern is subsequently melted out to permit of the pouring of metal into the mould cavity thus vacated." The inventor's appraisal of his own invention is of course of importance. *Timken-Detroit Axle Co.* v. *Cleveland Steel* 633

634 *Products Corp.*, 6 Cir., 148 F. 2d 267, 270, certiorari denied 326 U. S. 725. It is clear from this admission that all but the use of centrifugal casting to force the wax and the metal into their respective moulds was deemed old. The validity of this statement in Jungersen's British patent is amply demonstrated by the prior art.

Cellini, the great Florentine artist of the sixteenth century, described with painstaking detail the use of the multipart mould and the lost wax process. In fact, of course it is much older. 4 Encyc. Brit., 14th Ed., 240, 20 *id.* 229; and authorities cited in the opinion below, page 927 of 69 F. Supp. La Gravure, in the French publication
635 "Engraving, Carving, Moulding", 1924, received in this country in 1926, explicitly applied the process to small pieces of jewelry. So, too, Haseltine's British Patent, No. 2467, issued 1875, and Spencer's U. S. Patent, No. 748,996, issued 1904, taught the use of the primary and secondary moulds to reproduce an original model in all its detail. Moreover, both these latter patents also revealed the use of a flexible mould into which the wax is poured.

Thus plaintiff's patent can be sustained only if the use of force to cast the wax and the metal is such a change of a known method as to amount to invention. We think it is not. Indeed, the use of applied force to cast metal was shown in several patents prior to the plaintiff's. Haseltine
636 taught the use of pressure—about 20 pounds to the square inch—on the fluid metal where necessary to make the metal lie closely to the mould and produce a perfect casting. And McManus's U. S. Patent, No. 1,457,040, issued 1923, described a centrifugal casting machine. Although the machine seemed to have been intended primarily for use in making dental castings, yet notwithstanding this, he expressly stated that it might, with slight modifications, "be equally as well applied to the casting of jewelry", while Kralund's U. S. Patent, No. 1,238,789, issued 1917, taught

the use of force for introducing wax into intimate connection with the first die as well as upon the molten metal of the final casting. So we see that all the details embodied in the plaintiff's patent—save perhaps the centrifugal casting of the wax into the primary mould—were present in the art. It was known that if force were applied when metal was cast an accurate reproduction of the configurations and details of a model was assured. And McManus taught that the application of such force might be obtained by means of centrifugal casting. Applying these principles to a different material does not constitute invention; moreover, as we have seen, Kralund even applied force in introducing the wax to the die. 637 638

Plaintiff's most vigorous contention is, however, that the jewelry art has special requirements such as the complexity and minuteness of the mould and hence is nonanalogous to the prior art. But plaintiff himself indicates the contrary in his patent, for he says: "The principal object of this invention is to facilitate the casting of small metal articles, particularly articles of intricate detail such as jewelry." Thus the patent refers generally to the art of casting with a reference to jewelry as an example of the use to which the method may be put. Nowhere does the distinction that plaintiff now attempts to draw appear in his patent. And his British patent sheds some light as to what he claimed to introduce by way of novelty. As we have seen, the patent contained an express acknowledgment that many of the steps he proposed were old in the art. The reference was not to the art of jewelry, for the use of the primary and secondary moulds had not been used in the jewelry trade prior to that time. Obviously it was to the art of casting. So in that patent, when plaintiff sought to distinguish what he contributed from what previously existed in the field, he did not assert or even indicate that his contribution was nonanalogous to the prior 639

640 art. Rather, he treated as invention the introduction of what he considered to be a new step in a familiar method of casting, namely, the use of centrifugal force for casting the wax and the metal into the moulds. Yet, as we have seen, the use of such force in casting metal for jewelry had been indicated by McManus. Moreover, it was well-known as a general method; thus Stern's "Die-Casting Practice," published by the McGraw-Hill Book Company in 1930, compares and explains centrifugal casting and die casting, and shows how it is but a method of forcing the material into the mould. This is decisively shown also by the plaintiff himself in describing his course of invention as re-
641 counted in the opinion below. Thus he finally "fell on the idea of filling by centrifugal force," making "a swing out of a wired clothes-hanger that I could swing around in my hand * * * and after that * * * I went to a mechanical dentist" to make the final casting through the use of the dentist's centrifugal machine.

Hence the "flash of genius" must be found, if anywhere, in the plaintiff's recollection of the use of this force in dental casting and decision to apply it to this old process. Such, indeed, is the basis for the not inconsiderable success which the plaintiff appears to have had in prior litigation. In *Jungersen* v. *Jenkins,* D. C. Md., 30 F. Supp. 615, and in an unreported case before an English judge—
642 both substantially undefended by other manufacturers—and in *Jungersen* v. *Morris Kaysen Co.,* D. C. E. D. Pa., 31 F. Supp. 703, the use of centrifugal force, as well as the commercial success of the process, is stressed to uphold the invention. In *Ostby & Barton Co.* v. *Jungersen,* D. C. N. J., 65 F. Supp. 652, the same argument is developed extensively to reach the conclusion that claims 1 to 4 of the patent were valid, and claims 5 and 6 were invalid. Since there was no contention that the contesting parties had infringed the first four claims, the victory for

the claimed invention had something of a pyrrhic character. At any rate both parties appealed, the decision was affirmed per curiam, 3 Cir., 163 F. 2d 312, on the reasons assigned in the opinion below, and petitions for writs of certiorari by both parties were denied, 68 S. Ct. 356, Mr. Justice Black disagreeing as to the contestors' petition. The effect of the decision must necessarily be to limit plaintiff to the one method of use of centrifugal force. In view of the history of the process and the close equivalence of other methods, this would seem to be a substantial limitation on the patent. 643

The judge in the *Ostby & Barton* case referred to the use of centrifugal force as an "additional step" in the art which was both "new" and "novel." We are forced to disagree. It could hardly be an additional step; at most it can be only a modification or a different execution of an existing step. Nor, in view of its past employment, can we consider it new or novel. True, the process in its entirety had not been assembled for use in the manufacture of jewelry; but the addition made by plaintiff had been plainly indicated. The mere fact that the earlier references seemed to have made but little impression on the art of casting is in itself unimportant. *Western States Mach. Co.* v. *S. S. Hepworth Co.*, 2 Cir., 147 F. 2d 345, 350, certiorari denied 325 U. S. 873; *Condenser Corp. of America* v. *Micamold Radio Corp.*, 2 Cir., 145 F. 2d 878, certiorari denied 324 U. S. 861. The combination of such known elements is not invention. *Toledo Pressed Steel Co.* v. *Standard Parts*, 307 U. S. 350, 355-356; *Textile Mach. Works* v. *Louis Hirsch Textile Machines*, 302 U. S. 490, 497; *Paramount Publix Corp.* v. *American Tri-Ergon Corp.*, 294 U. S. 464, 474; *Powers-Kennedy Contracting Corp.* v. *Concrete Mixing & Conveying Co.*, 282 U. S. 175, 186. Nor is the application of an old process to a new and analogous use. *Dow Chemical Co.* v. 644 645

646 *Halliburton Oil Well Cementing Co.*, 324 U. S. 320, 327. In the past the commercial success enjoyed by plaintiff might well have sufficed to tip the balance in favor of validity. Recent Supreme Court pronouncements indicate clearly that commercial success cannot raise a combination of known elements to the exalted level of invention. *Funk Bros. Seed Co.* v. *Kalo Inoculant Co.*, S. Ct., Feb. 16, 1948; *Sinclair & Carroll Co.* v. *Interchemical Corp.*, 325 U. S. 327; *Paramount Publix Corp.* v. *American Tri-Ergon Corp.*, *supra*. See *Myerson* v. *Dentists' Supply Co.*; 2 Cir., 159 F. 2d 681. The elements here stressed by plaintiff were present in even stronger form in some of these cases, as witness our
647 view in *Interchemical Corp.* v. *Sinclair & Carroll Co.*, 2 Cir., 144 F. 2d 842, and that of the Seventh Circuit in *Kalo Inoculant Co.* v. *Funk Bros. Seed Co.*, 7 Cir., 161 F. 2d 981, each reversed in the recent Supreme Court decisions just cited. We should heed the admonition of these reversals.

What we have said of course disposes of claim 6, the product claim. There is nothing new in the product. *Risdon Iron & Locomotive Works* v. *Medart*, 158 U. S. 68, 81; *Pfanstiehl Chemical Co.* v. *American Platinum Works*, 3 Cir., 135 F. 2d 171, 173.

Judgment affirmed.

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L. HAND, *Circuit Judge* (dissenting):

In Jungersen's British patent, as my brothers truly say, he based his invention solely upon forcing the wax and the metal into completely intimate contact with every crevice of the mould, and for this he disclosed a centrifuge as the means. Moreover, it had already been known by other moulders of fine patterns that the metal might not fill all the spaces necessary for perfect reproduction. For

example, in 1873 Haseltine disclosed a device which set up 649
a pressure of twenty pounds to the square inch; and this too in a "lost wax" process. True, he did not disclose using similar pressure for the wax, and he did not use a centrifuge; but McManus used a centrifuge to force fusible metal into all the crevices of the mould, and that too in a "lost wax" process, the knowledge of which he appears to have assumed, for he does not disclose how to make the wax model. Kralund also showed a pressure die-casting process, as applied to the "lost wax" method; and he used pressure to force his wax into intimate connection with the first die as well as upon the molten metal of the final casting: but his original die was of steel and he does 650
not describe its manufacture.

Nevertheless, in spite of all these approaches, and of the fact that all the elements of the disclosure were to be found in the prior art, it remains true that Jungersen's process in its entirety had never been assembled before; no one had ever thought of combining all those steps in a single sequence. True, had the combination not been new in this objective sense, it could not have been patented merely by turning it to a new use; and that would have been so, although it might have taken as much originality to see that it could be put to the new use, as it takes to make an outstanding invention. It would have been a final 651
answer that Congress has never seen fit to extend its constitutional power to "discoveries" as such, and has limited patents to an "art, machine, manufacture or composition of matter",* as we have often said—the last time in *Old Town Ribbon & Carbon Co. Inc.* v. *Columbia Ribbon & Carbon Manufacturing Co.*** My point is that, if there is a new combination, however trifling the physical change

* §31, Title 35, U. S. C.

** 159 Fed. (2) 379, 382.

652 may be, nothing more is required than that, to take the step or steps added "invention", is needed; and "invention", whatever else it may be, is within the category of mental activities and of those alone. In the case at bar the answer must therefore depend upon how we shall appraise the departure from what had gone before in terms of creative imagination; indeed, I do not understand what other test could be relevant.

If that be the test, I submit that Jungersen's process meets it. From time immemorial jewelry had been manufactured by the earlier processes; so that the need, if need there was, had existed for years. Moreover, two of those
653 earlier processes—"cuttlefish casting and sand-casting"—have now become "of little commercial significance"; "die-stamping" and Jungersen's process "are the only substantial methods now commercially used"; and in the manufacture of a hundred rings or less "die-stamping" is more expensive. Had some technological advance held up the change, and had Jungersen made it only a short time after the obstacle had been removed, I should agree that the inference of outstanding originality would have been greatly weakened; but that was not the fact. Indeed, it is the very basis of the defence that for years all the elements lay open and available, and that nothing was needed but
654 the paltry modification which has proved so fruitful. To that I make the answer on which courts in the past used to ring the changes with wearisome iteration. If all the information was at hand, why was the new combination so long delayed? What better test of invention can one ask than the detection of that which others had all along had a strong inventive to discover, but had failed to see, though all the while it lay beneath their eyes? True, the whole approach to the subject has suffered a shift within the last decade or so, which I recognize that we should accept as authoritative. Moreover, I am not aware of the slightest

bias in favor of the present system; I should accept with equanimity a new system or no system. However, I confess myself baffled to know how to proceed, if we are at once to profess to apply the system as it is, and yet in every concrete instance we are to decide as though it did not exist as it is. In the case at bar, I can only say that, so far as I have been able to comprehend those factors which have been held to determine invention, and to which at least lip service continues to be paid, the combination in suit has every hall-mark of a valid patent. 655

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658 UNITED STATES CIRCUIT COURT OF APPEALS

SECOND CIRCUIT

At a Stated Term of the United States Circuit Court of Appeals, in and for the Second Circuit, held at the United States Courthouse in the City of New York, on the 10th day of March one thousand nine hundred and forty-eight.

Present: Hon: LEARNED HAND,
" AUGUSTUS N. HAND,
659 " CHARLES E. CLARK,
Circuit Judges.

THOGER GRONBERG JUNGERSEN,

Plaintiff-Appellant,

—v.—

ROBERT BADEN, *et al.*, d/b/a BADEN & FOSS,

Defendants-Appellees,

AXEL BROS., INC., *et al.*,

660 *Intervenors-Appellees.*

Appeal from the District Court of the United States for the Southern District of New York.

This cause came on to be heard on the transcript of record from the District Court of the United States for the Southern District of New York, and was argued by counsel.

ON CONSIDERATION WHEREOF, it is now hereby ordered, adjudged, and decreed that the judgment of said District Court be and it hereby is affirmed.

It is further ordered that a Mandate issue to the said District Court in accordance with this decree.

ALEANDER M. BELL,
Clerk.

UNITED STATES OF AMERCA

SOUTHERN DISTRICT OF NEW YORK

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I, ALEXANDER M. BELL, Clerk of the United States Circuit Court of Appeals for the Second Circuit, do hereby certify that the foregoing pages, numbered from 1 to 221, inclusive, contain a true and complete transcript of the record and proceedings had in said Court, in the case of

THOGER GRONBERG JUNGERSEN,

Plaintiff-Appellant,

against

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ROBERT BADEN, ROSE BADEN, ALBERT FOSS and GLADYS FOSS, *etc.*, d/b/a BADEN and FOSS,

Defendants-Appellees,

AXEL BROS., INC., *et al.*,

Intervenors-Appellees,

as the same remain of record and on file in my office.

IN TESTIMONY WHEREOF, I have caused the seal of the said Court to be hereunto affixed, at the City of New York, in the Southern District of New York, in the Second Circuit, this 14th day of April in the year of our Lord one thousand nine hundred and forty-eight, and of the Independence of the said United States the one hundred and seventy-second.

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(SEAL)

ALEXANDER M. BELL,
Clerk.